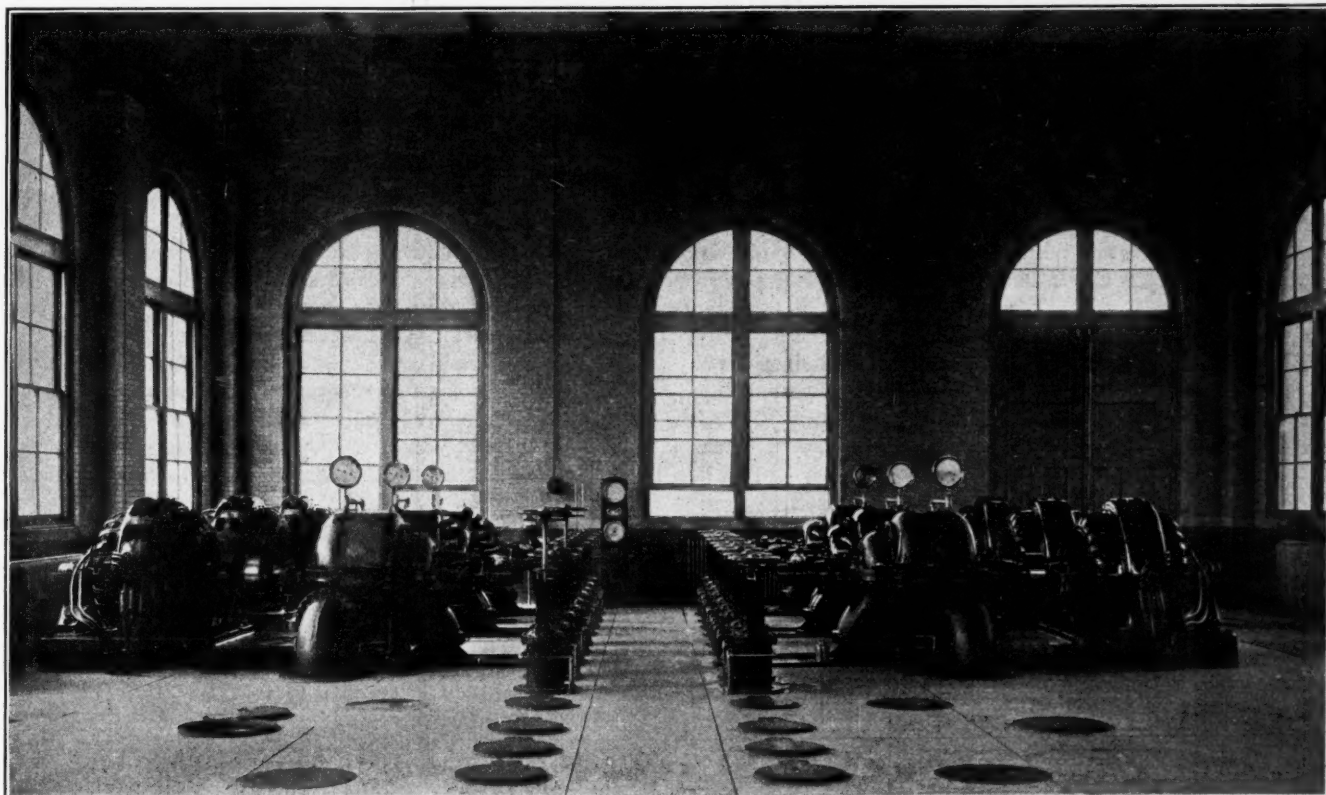


# Municipal Journal

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NIAGARA FALLS MUNICIPAL PUMPING PLANT.  
(Six 7-million gallon pumps. In foreground, openings left in floor for duplicating plant.)

## WATER WORKS OF NIAGARA FALLS

**Both Municipal and Private Plants.—Mechanical Filtration.—Electrically Driven Turbine Pumps.—Water Waste Investigation to Reduce Very High Consumption.—Department's Finances Independent of General City Funds.**

Water works matters in Niagara Falls, N. Y., are instructive in many respects. Not the least interesting feature has developed from the consolidation, twenty-one years ago, of the two separate villages of Suspension Bridge and Niagara Falls into the city of Niagara Falls, and the fact that Suspension Bridge was served with a private water plant (built in 1875), and Niagara Falls with a municipal one (built in 1879). For several years these two plants continued to serve separately their respective territories; but a few years ago the city obtained from the legislature permission to extend the municipal service into the territory covered by the franchise of the private company—the Western New York Water Company.

Both plants obtained their supply from the Niagara river and served it raw; and as the river became more and more polluted with sewage by the cities above, Niagara Falls acquired the reputation of having the

highest typhoid death rate of any city in the state; and the rate would undoubtedly have been much higher if account could have been taken of those among the thousands of visitors to that famous resort of newly wedded couples who contracted the disease there. A rate of 100 per 100,000 was frequently approximated, and in 1911 the rate was 157. Meantime the citizens had become aroused and filtration for the municipal plant was seriously considered five or six years ago, shortly after the present superintendent, W. J. Callahan, was appointed to that position. In May, 1910, bids were received for a mechanical filter plant, and the contract awarded to the Norwood Engineering Company, of Florence, Mass., for \$262,325.81, this covering the building and all appurtenances, as well as the plant itself.

The filter plant and a new pumping plant went into service January 1, 1912. (The filter plant has, under

the contract, been operated since then under the partial oversight of the Norwood company, and the acceptance test is being run this week.) The private company had previously put in a filtration plant, which was largely reconstructed in the spring of 1912 and was not ready for service until about June; and pressure upon it became so great that it arranged with the municipal company in the spring of that year to supply the water for its distribution system until such time as its own filters were completed. The filters of this company were installed by the New York Continental Jewell Filtration Company and have been in service about a year. They are the well-known standard gravity filters of this company, the filter boxes being of concrete, the sedimentation tank of steel, and a steel washwater tank also being provided.

As already stated, the city had obtained permission to parallel the mains of the private company, and there was a general desire among consumers of the company for service from the mains of the municipal plant last spring, after the high quality of water turned out by the municipal filters had been demonstrated. Since the beginning of 1912 about 2,500 services, supplying fully 3,000 families (many services supply flats) have changed from the private to the municipal mains, and about 200 applications are still on file and changes being made as rapidly as possible. The flat rates of the two services are the same, while the meter rates are from 12 to 3 cents by the municipal plant and from 15 to 3 cents by the private. (The municipal meter rates are considered more advantageous than the flat rates, and practically all new consumers are on meter.) Municipal mains have now been laid on each side (generally near the property line) of almost all streets containing private mains. Some consumers have, on the other hand, left the municipal for the private supply for one reason and another. At present the municipal plant is pumping about 14 million gallons a day and the private plant about 5 million.

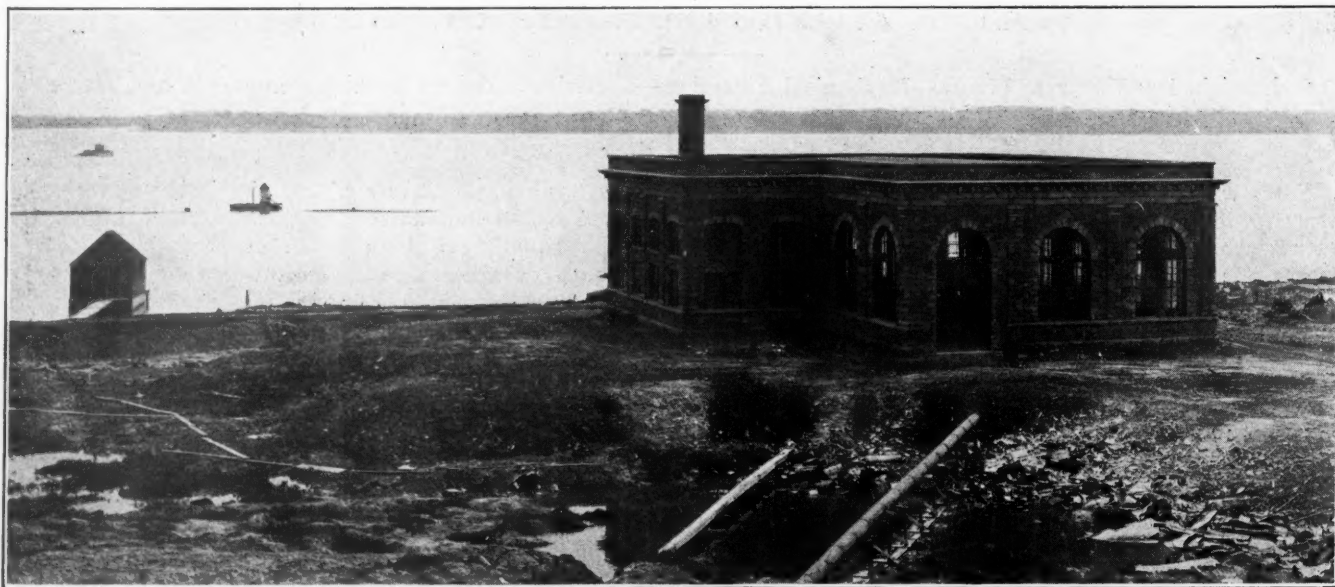
This total of 19 million gallons for a population of not over 40,000, or 475 gallons per capita, seems quite high, in spite of the fact that the city contains more large manufacturing plants, probably, than any other of its size in the country. The municipal services number about 6,500, 2,300 of which are metered. Trident,

Hersey, Gammon, Pittsburg and Lambert meters are used, and are sold at cost to the consumers and are owned by them but controlled by the city. To determine what and where the waste is, the water commissioners have employed the Pitometer Company and its representatives began about May 1 to investigate, and will probably complete their work in another six weeks. So far they have found at least two manufacturing companies obtaining water illegitimately by secret taps and hundreds of cases of defective plumbing. In a preliminary report made May 23 they say: "In a residential district having only domestic consumption the minimum night rate was found to be about 90 per cent of the average daily consumption, which should not have been over 40 per cent for ordinary conditions. This particular district contained about 1,100 families, of which 700 were unmetered. An inspection of the unmetered services revealed the fact that defective plumbing was chiefly the cause of the waste. A careful inspection of all plumbing fixtures in the city has not been made within the past five years, and consequently fixtures are in bad need of immediate repair.

"The new pumping station and filtration plant which was designed to meet the needs for ten years' growth is at present working almost at full capacity, and unless waste is restricted it will be necessary within a very short period to make extensions to the station and filtration plant which will probably cost not less than \$100,000."

On this point the commission's engineer, W. D. Robbins, reported on September 30, 1912: "I wish again to call your attention to the great amount of water being pumped, which reached one day last week, for a period of 4 hours, the rate of 21 million gallons per day, while for the rest of that particular day the rate was 14½ million. Unless something is done to reduce the water consumption an additional low pressure pump of 9 million gallons should be installed."

There are now in use by the city plant 78 miles of cast iron pipe of sizes from 36-inch to 4-inch; there being very little of the latter, most of which is used for one of the mains where there is one on each side of a street. No fire hydrants are taken off of 4-inch mains. Originally there were very few valves on the pipe system, but now there is one at practically every corner.



GENERAL VIEW OF PUMPING STATION AND INTAKES.

Main intake crib at left background; emergency crib between that and station. In foreground, wire conduit and wood-covered steam pipe. Filtered water basin under fill at left of station.



Whenever a street is to be improved all services needed or anticipated are put in, those not for immediate use being carried to the curb only. There are at present about two thousand services so laid which are not yet in use. The water department makes all taps, charging \$2.50 for a  $\frac{3}{4}$ -inch and \$3 for a 1-inch. This is for tapping and corporation cock only, licensed plumbers laying the service pipe. For 4-inch to 8-inch branches from old mains a No. 1 Smith tapping machine is used. The largest tap yet made is a 12-inch, for which a tapping machine was rented.

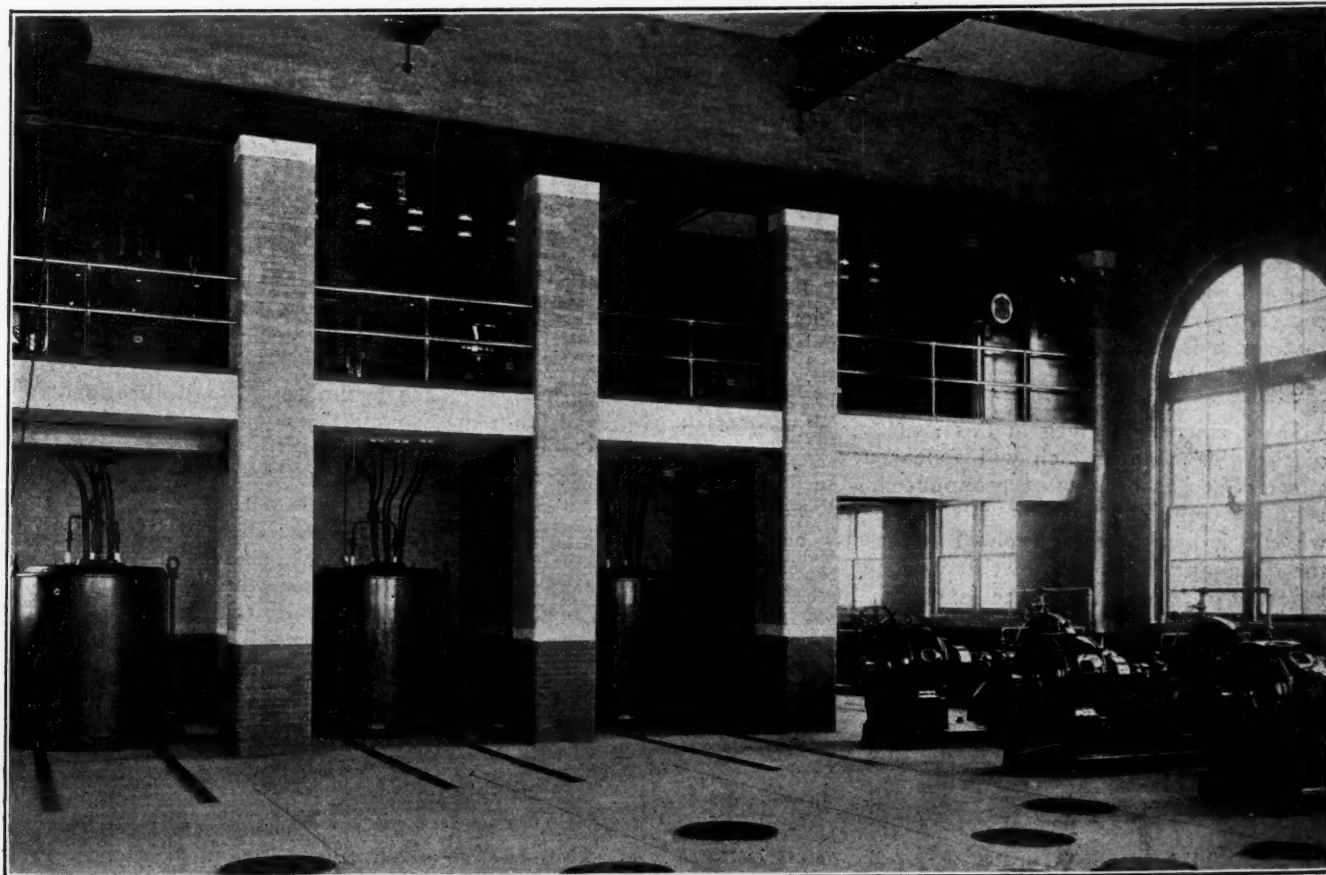
The pumping plant was originally near the business center, but advantage was taken of the construction of the filters, land for which was not available near the station, to move the pumping plant  $2\frac{1}{2}$  miles up stream. Here about 17 acres was purchased on the bank of Niagara river above the falls and a pumping station built at the water's edge, the filter plant being two hundred feet or so back from the river. An intake crib was built 2,600 feet from shore, and an emergency crib 800 feet out for use in case of accident to the other. In determining the best location for the intake, samples were made of the water at various points and the depth of water, effect of currents, ice, etc., were taken into consideration.

The main intake crib is of timber and concrete, about 100 feet long and 24 feet wide; the emergency intake is a crib about 25 feet by 10 feet. Leading in from the larger crib is 2,200 feet of 48-inch riveted steel pipe. This was laid under water in 60-foot lengths bolted together, the top of the pipe being 25 feet below the surface of the water. All of the joints were carefully inspected by a diver employed by the city. In order that this line may be extended to the Canadian channel, if this should ever be desirable, a 48-inch line was

carried out from the further side of the crib for a short distance and terminated with a valve, and a trench was blasted out of the rock for 70 feet beyond the crib so that the pipe line can be extended without any interference with the operation of the plant. These intake cribs and the pipe line cost \$71,789. During two winter seasons no trouble has been experienced from ice. Water is taken at a point several feet below the surface but well above the bottom, and the area of the intake opening was made of such size that the velocity down the river is greater than that into the intake, and there are practically no eddies over the intake. The crib has cable connection with the pumping station for light and telephone.

The pumping station is a neat appearing building, 84 by 53 feet, with a 50 by 24-foot annex, built of dark limestone with sandstone trimming, the interior being faced with mottled buff brick. Under the main floor are a raw water basin, directly under the low lift pumps, and a filtered water basin which extends beyond the building, the two together being 84 by 115 feet by 20 feet deep. Piling was necessary for supporting the structure, 600 piles being used. The building and basins cost \$66,979.

The pumping equipment consists of three low lift pumps, which raise the raw water to the purification plant, and six high-lift pumps which maintain a pressure of 75 pounds by direct pumping, there being no reservoir or standpipe. The latter engines are Allis-Chalmers 7 million gallon, two-stage, high pressure turbine pumps, direct connected to 300 h.p., 3-phase, 440-volt induction motors, operating at 735 revolutions per minute. These can be run in series to deliver half the amount of water at 180 pounds pressure if desired, which would be only in case of a



TRANSFORMERS AND LOW LIFT PUMPS.

Switchboard in gallery above transformers. In foreground, openings left in floor for duplicating high lift plant.

very serious conflagration. Two pumps are used constantly, and so far it has been sufficient to add a third pump in case of fire, which raises the pressure to 105 pounds. (All fire alarms are rung in the station and also recorded automatically on a tape.) The pressure may be varied within the limits of 60 and 110 pounds with satisfactory operation. The three low pressure pumps are also each of 7 million gallons capacity under a pressure head of about 10 feet, single stage, direct connected to 50 h.p., 3-phase, 440-volt induction motors. Arrangement is made for duplicating both high lift and low lift pumps, openings being left in the floor for suction and discharge pipes. Both the high and low lift discharge mains terminate in a valve beyond the connection with the last of the pumps now installed, so that the new installation can be connected up and put into service without a moment's interference with the service.

The low lift pumps take the raw water from the raw water basin and raise it into the filtration plant through a 36-inch cast iron pipe. The purified water from that plant returns to the filtered water basin under the pumping station through another 36-inch line, whence it is drawn by the high pressure pumps. The discharge from these is measured by a Venturi meter.

A portable motor-driven air compressor is used for blowing out of the motors at the pumping station and filter plant the great amount of dust which comes from the nearby factories.

The current for operating the plant is received at 11,000 volts, and is transformed to 440 by three 625 k.v.a., oil insulated, water cooled transformers. There are two switchboards, one for the incoming high tension current, having oil switches, with remote control; the other for the low tension current and the motor controls. The cost of this equipment was \$78,220.

There are also, in the basement of the station, two steam boilers for heating, and piping and radiators in the buildings; and a steam main inside a wood stave pipe leads to the filter plant building for heating that. This wood-encased main is shown in one of the illustrations, and near it is a conduit for the wires which bring the current to the building. Current is purchased from the Hydraulic Power Company at \$9 per h.p. year (and the use of certain city property); while connection is also made with the Niagara Falls Power Company's cable for emergency use, for which connection a rental is paid, and \$25 per h.p. year for any power used. The former company has two power houses, the latter has four, so that there is little danger of failure of power; but as additional precaution an elevated tank holding one hour's supply for the city is being considered.

Space cannot be given in this issue for a description of the filter plant, which will appear next week. The effect of it has been most pronounced. On January 1, 1912, when the city began supplying filtered water, there were 28 known cases of typhoid in the city, and during the remaining 11 months of that year only 30 cases were reported, of which two were known to have been contracted out of the city. In 1911 355 cases had been reported. The typhoid statistics for the past six years were as follows:

Year	Cases	Deaths per 100,000
1907	140	97.1
1908	114	68.6
1909	229	74.3
1910	178	88.5
1911	355	157.0
1912	30*	14.3*

\*Not including the 28 cases in January.

Taking twelve-elevenths of 14.3 gives 15.6 as the annual rate for 1912, as compared with 97.1, the average

rate for the previous five years, or with 68.6, the lowest rate during that period.

The water department's finances are independent of the general funds of the city, payment being made to it for hydrant service and water supplied to schools and other buildings, except that water is furnished free for two hospitals, for parks and drinking fountains and for sprinkling and flushing streets and flushing sewers. The department pays from its income the interest on outstanding bonds and redeems these bonds as they mature; also makes ordinary extensions. For extraordinary extensions, new pumping and filter plant, etc., bonds were issued four years ago. At present there are outstanding \$1,219,500 of bonds. Expenditures for taps and meters are charged to the consumers. About .43 per cent of the revenue is from metered services. Factories are charged for making fire connections and for detector meters, which must be placed on all such services, but no other charge is made except for any water which may be registered.

During the year ending December 1, 1912, the receipts and expenditures of the municipal plant were as follows:

#### RECEIPTS.

Flat rate water rents.....	\$36,868.44	
Meter water rents.....	28,715.78	
From city for 708 fire hydrants @ \$35..	24,780.00	
From city for 6 fire halls, 8 schools, library, watering troughs, etc.....	5,000.00	
Meter sales .....	1,835.00	
Tapping .....	1,405.50	
Miscellaneous .....	787.55	
		\$99,392.27

#### DISBURSEMENTS.

Office expenses:		
Clerk .....	\$1,522.50	
Supplies and sundries.....	528.37	
Pumping department:		
Engineers and labor.....	6,505.73	
Power .....	9,387.69	
Coal, oil, waste, repairs and sundry expenses .....	3,301.50	
Filter department:		
Chemist and operators.....	3,282.25	
Supplies .....	6,817.63	
Street department:		
Superintendent and labor.....	7,749.50	
Sundry expenses.....	4,607.01	
Rebates allowed .....	94.82	
		43,797.00

Net earnings ..... \$55,595.27

From this there was paid \$51,815.23 interest on bonds, and the balance into the sinking fund.

#### TRENTON'S NEW FILTRATION PLANT.

Trenton, N. J., has begun work on a filtration plant intended to remedy conditions which have for years caused great concern to the citizens and the local and state boards of health. Four ten-million gallon centrifugal pumps will raise water from the Delaware river to two sedimentation basins, each 210 by 62 ft. by 18½ ft. deep. Aluminum sulphate will be added to the water as it enters the basins. From here the water will pass to the filters, of which there are 16, each with a sand area of 652 sq. ft. Under the filters will be the filtered water basin, from which the purified water will pass through a five-foot pipe to the high-lift pumps, which will raise it into the city reservoir. Arrangement is made for adding hypochlorite to the water as it leaves the filtered water basin, when this may be necessary. Excavation for one of the sedimentation basins has been practically completed, and forty men and seven teams are engaged on the work. The plant was designed by Johnson & Fuller, of New York, who are supervising the construction, F. W. Daggett being their representative in immediate charge.



## MADISON WATER WORKS OPERATION

Calculation of Equitable Rates for Private Consumers and the City, Respectively.—Purchase of Coal on the British Thermal Unit Basis.—Property Owners Pay for Laying Services.

The report of the Board of Water Commissioners of Madison, Wisconsin, for the year 1912 contains an unusual amount of interesting information concerning advanced methods of running a municipal water works department. One of the minor points is the fact that a card index system of recording all meters tested and repaired is kept up to date and furnishes much valuable information for use, when annual contracts for meters are let, as to the satisfactoriness of the various makes, in addition to the general advantages of keeping an exact history of each meter.

In the latter part of 1911 the Common Council passed an ordinance requiring the water department to lay services on all newly improved streets at the expense of the property benefited. During 1912, 159 services were laid under this ordinance, 114 of these being  $\frac{3}{8}$  inch, and 45 being  $\frac{1}{4}$  inch. These were laid by a large gang of men in charge of a competent foreman, which resulted in the work being done economically, the average cost of the services being approximately \$6.50 each, including all expenses.

Two matters which are given considerable space in the report are the purchase of fuel on a basis of the B. t. u., and the determination by calculation of equitable rates for private consumers and for the city, respectively.

Pocahontas coal was used for fuel until July, 1912 when bids were received for the following year's supply. Bids were submitted for 2,500 tons of bituminous coal in accordance with the specifications requiring that the coal be "freshly mined, of the grade and quality specified in the proposal, and practically free from dirt, pyrites, stones, slate, or other foreign matter. If screened or washed coal is furnished, it shall conform closely to the sizes specified and contain not to exceed 5 per cent. of dust or fine coal that will pass a  $\frac{1}{8}$ -inch. round hole." It was provided that samples of coal should be taken from each load amounting to from 0.1 to 0.2 per cent of the whole amount; the samples being crushed, mixed, quartered, etc., after the common method of treating coal samples. "Coal which works well in the furnaces and does not carry ash in excess of 2 per cent greater than that specified in the proposal, may be accepted and paid for at the base price, the ash to be determined in such case by the station records of coal burned and refuse weighed out. Coal which carries more than 2 per cent excess of ash, determined as above, or which for any reason does not work well in the furnaces, or is open to criticism, will not be accepted at the base price. In such case, the sample collected will be sent to the chemical engineering department of the University of Wisconsin for analysis and test, and their values shall be the basis for settlement in accordance with the following bonus and penalty schedule. Coal which is otherwise satisfactory, does not vary more than 100 B. t. u. above or below

specified heat value, does not carry more than 2 per cent excess ash nor  $\frac{1}{2}$  per cent excess sulphur, will be paid for at the base price. Coal which varies beyond such limits, will be increased or diminished in prices as follows: For each 100 B. t. u. or majority fraction thereof, above or below the specified value, the price shall be increased or diminished in a proportional amount. For each 1 per cent increase in ash above the 2 per cent allowable variation, the price shall be reduced as set forth below:

First, 1 per cent increase .....	2 cents per ton.
Second, 1 per cent increase .....	4 " "
Third, 1 per cent increase .....	7 " "
Fourth, 1 per cent increase .....	12 " "
Fifth, 1 per cent increase .....	18 " "

or coal rejected. For each  $\frac{1}{4}$  per cent increase in sulphur over the specified amount, the price shall be diminished by 3 cents per ton."

It was further provided that Pocahontas coal would not be considered if the percentages exceeded the following: Moisture, 5; volatile matter, 20; ash, 6; sulphur, 1.25 (determined separately). For other coals the following maximum limits were established: Moisture, 10; volatile matter, 34; ash, 10; sulphur, 1.50.

The bids received were on coal having the properties shown in the accompanying table, and the contract was awarded for the coal standing fifth in the table. While 13,300 B. t. u. was the basis of this bid, the first lot furnished showed but 13,150, the second fell to 12,801, the third to 12,496, and the fourth to 12,862. In addition to the low B. t. u., the coal smoked considerably, so the rest of the contract was filled with coal listed fourth in the table which had been offered by the same contractor.

Concerning the change in the method of purchasing coal, E. E. Parker, engineer of the Board of Water Commissioners, reported as follows:

The Pocahontas coal cost \$4.35 per ton delivered at the station during the forepart of the year, but when the bids for the year's supply were received, the price of the Pocahontas went up to \$4.80 per ton. The Carterville No. 3 and No. 4 washed cost \$3.75 per ton and the New Kentucky screenings cost \$3.65 per ton.

It is interesting to note the saving in the fuel bill occasioned by the substitution of the New Kentucky screenings for the Pocahontas coal. During the first seven months of the year when Pocahontas coal was burned, it required 2,633,700 pounds of coal to pump 406,346,650 gallons against a total head of 230 feet and 268,967,000 gallons against a total head of 65 feet. The duty per 100 pounds of coal consumed was

$$\frac{[(406,346,650 \times 8.34 \times 230) + (268,967,000 \times 8.34 \times 65)]}{2,633,700} = 100$$

or 35,150,000 foot pounds per 100 pounds coal consumed.

If Pocahontas coal had been used during the last five months of the year and the same duty obtained as dur-

CITY OF MADISON, WISCONSIN.—WATER DEPARTMENT.—Analysis of Bids Received on Coal, Friday, July 5, 1912.

Size of Coal			Properties of Coal and B.T.U. per lb., dry.									Probable			
No.	Over.	Through.	Type of screen.	Mois- ture %	Volat- ile mat- ter %	Fixed car- bon %	Ash %	Sul- phur %	Dust, %.	B.T.U. dry.	Base price bid.	Cost per million B.T.U.	Bonus per ton.	Penalty per ton.	Result'g price per ton.
1	.....	$\frac{3}{8}$ -in.	Round	5.00	20.00	64.00	6.00	1.25	5.00	13,900	\$5.05	\$19.12	.....	.....	.....
2	(?)	(?)	(?)	8.55	29.91	51.11	8.93	1.50	(?)	13,150	3.90	16.23	.....	.....	.....
3	.....	$\frac{1}{2}$ -in.	.....	5.00	20.00	65.00	6.00	1.25	4.00	14,000	4.80	18.05	.....	.....	.....
4	.....	$\frac{1}{2}$ -in.	Diamond	8.00	29.00	53.75	8.00	1.25	....	13,000	3.65	15.27	.....	.....	.....
5	No. 3- $\frac{3}{4}$ -in. No. 3-1-in.			Round	8.50	29.96	51.14	8.90	1.50	....	13,300	3.75	15.42	.....	.....
6	No. 4- $\frac{1}{4}$ -in. No. 4- $\frac{3}{4}$ -in.														
7	.....	.....													
8	.....	.....													
9	.....	.....													
6	.....	.....	.....	5.00	21.00	65.00	8.00	1.00	....	14,000	5.00	18.78	.....	.....	.....
7	.....	.....	.....	9.00	30.00	50.00	9.00	1.50	....	13,300	4.00	16.53	.....	.....	.....
8	.....	.....	.....	8.00	29.00	53.75	8.00	1.25	....	12,000	3.90	17.65	11 to 12c	.....	4.00
9	.....	.....	.....	5.00	20.00	65.00	5.80	1.20	4.00	13,400	5.07 $\frac{1}{2}$	19.95	.....	.....	.....

ing the first seven months, the cost of fuel per 1,000,000 foot pounds duty would have been

$\frac{4.80}{20 \times 35,150,000}$  or .00683 dollar.

During the last five months of the year when New Kentucky screenings were burned, it required 2,380,900 pounds of coal to pump 308,590,450 gallons against a total head of 230 feet and 256,222,000 gallons against a total head of 65 feet. The duty per 100 pounds of coal consumed was

$$\frac{[(308,590,450 \times 8.34 \times 230) + (256,222,000 \times 8.34 \times 65)] 100}{2,380,900}$$

or 30,670,000 foot pounds per 100 pounds coal consumed.

The cost of fuel per 1,000,000 foot pounds duty was  $\frac{3.65}{20 \times 30,670,000}$  or .00595 dollar.

The difference in the cost of fuel per 1,000,000 foot pounds duty was .00683—.00595=.00088 dollar, or a saving in favor of the New Kentucky Screenings over the Pocahontas coal of  $\frac{.00088}{.00683}$  or 12.9%. On the yearly fuel bill of \$10,000, this amounts to \$1,290.00, a very material saving.

#### DETERMINATION OF PUBLIC AND PRIVATE RATES.

The description of the calculation made as a basis for determining public and private rates is given in full as described by Mr. Parker, his report being as follows:

In order to determine the equitable rates for private consumers and the amount the city as a whole should pay to the Water Department, an analysis similar to that made by the Railroad Rate Commission in their decision has been made.

The system of classification of expenditures installed in the department some two years ago gives all the information necessary to make this analysis, and to deter-

mine what the equitable amount is that the city as a whole should pay to the department.

**Total Cost of Service.**—The actual operating expenses were \$34,123.52. The total cost of furnishing the service may be summarized as follows:

Operating expenses .....	\$34,123.52
Interest .....	26,684.75
Taxes .....	8,750.00
Depreciation .....	3,500.00

Total cost of service .....\$73,058.27

From the above must be deducted the \$767.10 representing the operating expenses chargeable to the high school power system. This leaves \$72,291.17 as the net total cost of furnishing water.

**Capacity and Output Expenses.**—Having determined the total cost of the service, the next problem is to distribute this cost so that the different classes of consumers will bear their just share of the burden. Before the extent of this burden can be determined, it is necessary to separate the operating expenses into capacity and output expenses. The separation into capacity and output expenses is given in the table.

**Capacity Expenses.**—Quoting from the report of the Railroad Rate Commission: "This class of expenses represents that portion of the cost of the service which accrues by virtue of the fact that a utility is compelled to have in readiness a plant, equipment, installation, supplies and labor to meet the demand which may be made upon it by the consuming public. It is that portion of the cost which is incurred independently of any expense of actually furnishing water. It is rather the expense incurred by the utility in holding itself in

MADISON WATERWORKS, 1912.  
Separation of Expenses into Capacity and Output Expenses.

	Total.	Capacity. Per cent.	Amount.	Output. Per cent.	Amount.	Direct municipal.
<b>Pumping:</b>						
Pump labor .....	\$6,401.79	70	\$4,481.25	30	\$1,920.54	.....
Miscellaneous Labor .....	44.02	100	44.02	..	.....	.....
Steam generated .....	14,187.33	25	3,546.83	75	10,640.50	.....
Lubricants .....	580.73	5	29.04	95	551.69	.....
Miscellaneous station supplies and expenses .....	766.94	50	383.47	50	383.47	.....
Maintenance of pump equipment .....	810.40	40	324.16	60	486.24	.....
Maintenance of buildings and grounds.....	180.72	100	180.72	..	.....	.....
Total pumping .....	22,971.93	..	8,989.49	..	13,982.44	.....
<b>Distribution:</b>						
Street labor department .....	221.76	100	221.76	..	.....	.....
Meter and fittings department labor .....	133.63	100	133.63	..	.....	.....
Street department supplies and expenses .....	251.42	100	251.42	..	.....	.....
Maintenance of reservoirs and standpipe .....	52.25	100	52.25	..	.....	.....
Maintenance of mains .....	398.72	100	398.72	..	.....	.....
Maintenance of services .....	677.25	70	474.07	30	203.18	.....
Maintenance of meters .....	1,728.30	70	1,209.88	30	518.52	.....
Maintenance of hydrants .....	1,388.89	..	.....	..	.....	1,388.89
Maintenance of fountains and troughs .....	17.35	..	.....	..	.....	17.35
Total distribution .....	4,869.97	..	2,742.03	..	721.70	1,406.24
<b>Commercial:</b>						
Reading meters .....	1,148.55	100	1,148.55	..	.....	.....
Miscellaneous supplies and expenses .....	198.69	100	198.69	..	.....	.....
Salaries .....	1,850.83	100	1,850.83	..	.....	.....
Total commercial .....	3,198.07	..	3,198.07	..	.....	.....
<b>General:</b>						
Salaries of general officers .....	425.00	100	425.00	..	.....	.....
Salaries of general office clerks .....	374.93	80	299.94	20	74.99	.....
Miscellaneous office supplies and expenses .....	165.21	80	132.17	20	33.04	.....
Miscellaneous general expenses .....	1,314.80	100	1,314.80	..	.....	.....
Total general .....	2,279.94	..	2,171.91	..	108.03	.....
<b>Undistributed:</b>						
Taxes and insurance .....	82.75	100	82.75	..	.....	.....
Utility department .....	720.86	100	720.86	..	.....	.....
Total undistributed .....	803.61	..	803.61	..	.....	.....
Total actual operating expenses.....	34,123.52	..	17,905.11	..	14,812.17	1,406.24
Deduction (high school light and power) .....	767.10	..	383.55	..	383.55	.....
Net actual operating expense .....	33,356.42	..	17,521.56	..	14,428.62	1,406.24
<b>Total Capacity and Output—Cost of Service:</b>						
Actual operating expenses .....	31,950.18	54.83	17,521.56	45.17	14,428.62	.....
Special operating expenses .....	12,250.00	..	6,716.67	..	4,533.33	.....
Interest .....	26,684.75	..	14,637.39	..	12,047.36	.....
Total .....	70,884.93	..	38,875.62	..	32,009.31	.....
Direct municipal charge .....	1,406.24	..	.....	..	.....	.....
Grand total .....	\$72,291.17	..	.....	..	.....	.....



readiness to furnish water at any time in any quantity. The amount of capacity expense which is charged against any consumer is the price that in justice he should pay for the right of demanding service from the utility, however great or small that service may be. It remains now to determine the principles in accordance with which this total capacity cost should be distributed.

"Nearly every water works plant is constructed for the purpose of supplying two great demands—public and private. Each of these demands requires a certain portion of the investment of every utility."

The engineers of the Railroad Rate Commission separated the total value of the plant into the corresponding classes of investment, viz.:

1. That which is devoted to public service; and
2. That which is devoted to domestic and industrial service.

They determine that 49.6% was devoted to public use and 50.4% was devoted to private use. These percentages represent the relative values of hypothetical plants required to supply the public and private demands. Applying this ratio to the capacity expenses, we find the fixed costs chargeable against the two classes of consumers to be as follows:

Apportionment of Capacity Expenses.			
	Municipal 49.6%	Private 50.4%	Total 100%
Amount .....	\$19,282.31	\$19,593.31	\$38,875.62
Direct charge .....	1,406.24	.....	1,406.24
	<u>\$20,688.55</u>	<u>\$19,593.31</u>	<u>\$40,281.86</u>

**Output Expenses.**—In apportioning the output expenses, the actual consumption for public and private purposes is the accepted basis, but in order to establish the ratio between the two consumptions it is necessary to analyze the total pumpage. The following table gives the analysis of the total pumpage for the year ending December 31, 1912:

Analysis of Total Pumpage.			
Private consumption:			
Metered .....	412,616,446		
Unmetered .....	3,000,000		
Schools .....	13,164,375		
Municipal buildings, metered .....	5,427,727		
Municipal buildings, unmetered...	225,000		
Fountains, metered .....	3,752,940		
Fountains, unmetered .....	12,525,000		
			450,711,488
Public consumption:			
Sewer flushing .....	10,000,000		
Street sprinkling .....	20,000,000		
Street construction .....	5,000,000		
			35,000,000
Consumed in operation:			
Lost, unaccounted for, slippage, flushing mains, etc. ....			229,225,612
Total .....			714,937,100
Private and Public Consumption.			
	Gallons	Per cent	
Private .....	450,711,488	92.7	
Public .....	35,000,000	7.3	
Total .....	485,711,488	100.0	

The private consumption is higher than it normally would be owing to the 11,000,000 gallons used by the university.

The following table gives the apportionment of the output expenses:

Apportionment of Output Expenses.			
	Municipal 7.3%	Private 92.7%	Total 100%
Amount .....	\$2,336.68	\$29,672.63	\$32,009.31

The following table gives the total apportionment of operating expenses:

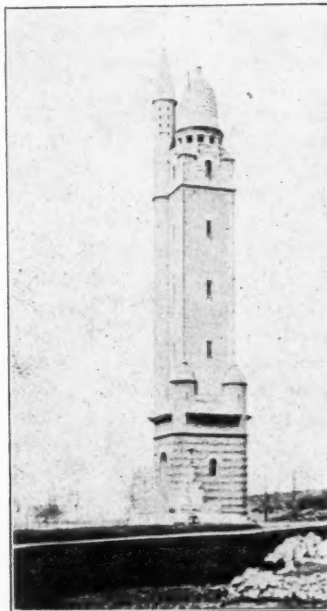
Total Apportionment of Operating Expenses.			
	Municipal	Private	Total
Capacity .....	\$20,688.55	\$19,593.31	\$40,281.86
Output .....	2,336.68	29,672.63	32,009.31
Total .....	<u>\$23,025.23</u>	<u>\$49,275.94</u>	<u>\$72,291.17</u>

From the above table it appears that the city should have paid \$23,025.23 for the year to the Water Department and that private consumers should have paid \$49,275.94.

It is of interest to note that the city actually did pay interest on water works bonds of \$5,318.00 and a hydrant rental charge of \$14,760.00 to the department, or a total amount of \$20,078.00, while the private consumers paid a total of \$54,435.17. Or in other words, the city paid \$2,947.23 less than it should have and the private consumers paid \$5,169.23 more than they should have.

### ST. LOUIS WATER TOWER.

A beautiful architectural work for a strictly utilitarian purpose is the South St. Louis water tower, part of the city water storage system. The standpipe within the tower has a diameter of 8 feet. The tower is about 250 feet high, and is one of three in St. Louis constructed on the same principle. It has a capacity of about 50,000 cubic feet, and the steel pipe is encircled by a spiral staircase of 198 steps. Above this are a couple of turrets, from which a wonderful view of the city is obtained. The structure is medieval in appearance and rises from a foundation of massive granite blocks like the fortified towers of some Romanesque castle.



ST. LOUIS WATER TOWER

This tower of course affects only a small part of the distribution, which averages more than eighty million gallons a day, and is occasionally 50 per cent. more.

### CLEANING A RESERVOIR SITE.

The water commission of Clinton, Mass., during 1912 prepared for use as a reservoir a mill pond known as Heywood pond, and adjacent land, doing the work by day labor. The total area purchased was about 40.6 acres, the pond occupying about ten acres of this.

This pond contained in its bottom muck varying from one to fourteen feet in depth, and in preparing the reservoir it seemed desirable to remove this and also to clear and grub about ten acres of the wooded land surrounding it. Work on this was begun on the 12th of August. The pond had been drained by means of a large ditch dug through the old mill dam, and the condition of the bottom investigated. It was found that at the north end of the pond the mud was so saturated with water that it was necessary to dig ditches to drain it sufficiently dry to permit handling it. During the excavation several large pockets were encountered, where it was necessary to install a gasoline pump to keep the water

out. A ditch 4 feet deep was dug to carry away the water that was taken from these pockets.

In most places the pond bottom was hard enough to allow the double teams to be drawn up to the wall of muck and filled by hand, and for the loaded teams to be hauled to land owned by the department which was above the high water mark of the reservoir, where much of the muck was dumped and spread, some of it being also hauled to an adjoining property. In one place, however, the depth of the muck was so great and the bottom was so soft that teams could not be driven to a position advantageous for loading, and it was necessary to use wheelbarrows for bringing the muck to the nearest point to which the wagons could be driven, where it was loaded into them by hand. About 800 cubic yards were removed by wheelbarrows in this way; about 40,000 cubic yards were loaded directly into the wagons. The muck was hauled from 300 to 1,000 feet to the dumping ground. Several roads were constructed on the bottom

of the pond for the use of these teams, and during the dry spell these were in good condition, but after severe rains they became covered with water and it was necessary to work around the sides of the pond. During the cold weather of last winter the surface of the muck hardened sufficiently to allow the teams to be driven in over it, but this lasted for only a few days.

In all about 8 acres of pond bottom had been cleaned by February 1st of this year, on which the muck ranged from one to fourteen feet in depth. An acre and a half of pond remained to be cleaned on which the muck had an average depth of about 10 feet.

From 50 to 95 laborers were employed during the excavation, and from 12 to 30 double teams. In connection with this work, 10 acres of brush and woodland were cleared on both sides of the pond, the brush being burned and the cord wood sold for \$106.50. The cost of this work was as follows: Labor, \$12,347; teaming, \$6,808; transporting laborers, \$1,632; a total of \$20,787.

## SETTLING BASIN AT LEXINGTON

Recent Addition to Plant of Water Company to Prevent Trouble from Algae Growths and Turbidity.—Construction and Operation.—Some Unusual Features of Design.—Use of Coagulant and Hypochlorite.

By H. W. SOUTHARD, C. E.

The water supply for the City of Lexington, Ky., is obtained from four storage reservoirs which impound a mixture of surface and spring waters.

The Lexington Hydraulic and Manufacturing Co., which furnishes the city with its water supply, owns practically the entire water-shed and exercises great care in keeping it free from pollution. The reservoirs are two miles from the city line.

The purification plant formerly consisted of 10 Jewell gravity type filters. The unfiltered water from the storage reservoirs was pumped directly upon the filters, and the effluent from these was discharged into the clear water well by gravity, whence it was pumped directly to the consumers under sixty pounds pressure. (At times of fire the pressure is increased to at least ninety pounds.)

The pumping equipment consists of four Holly pumping engines of six, three, one and one-half and one million gallons capacity respectively. As the present consumption is between three and four million gallons per day it is seen that the company has plenty of reserve capacity. The six and three million gallon units are in regular use day and night respectively, the two smaller units being held in reserve.

During the summer months, beginning sometimes as early as the first of May and extending through November, there is considerable trouble from algae growths in the storage reservoirs. During the rainy season the water in the storage reservoirs becomes very turbid.

Owing to these conditions it was necessary to wash the filters at short intervals. The filters are washed by pumping filtered water in a reverse direction through the sand, which is agitated by revolving rakes. The cost of too frequent filter washing, and trouble from algae growths (which copper sulphate treatments do not wholly eliminate), together with a desire to furnish the best quality of water obtainable, were the reasons for installing the settling basin.

The new basin is located on a side hill about two hundred feet from the pumping station. The floor of the basin is at the same elevation as the center of the inlet pipe to the filters. This makes it possible to utilize all except the last foot or two of the water, depending on the amount of deposit in the basin.

The excavation for the basin was in stiff yellow and red clay, except at the back, where a few yards of rock were removed, and varied in depth from zero at the front to some twenty-two feet at the rear. After the construction of the outside walls, the clay made excellent material for back-filling. It was well rammed in six to twelve-inch layers.

The hill at the rear and sides of the basin was cut back on a two to one slope. Drainage ditches were placed at the foot of the slope, which is four feet from the outside walls. Embankments extending to within a foot of the top of the walls were formed at the front and sides of the basin and around the valve house.

The basin is two hundred feet square by ten feet deep, inside dimensions, and holds about three million gallons. It is designed to take care of twelve million gallons per day, which is the capacity of the drainage area. A central wall divides the basin into two distinct compartments entirely independent of each other. One may be kept in use while the other is being cleaned.

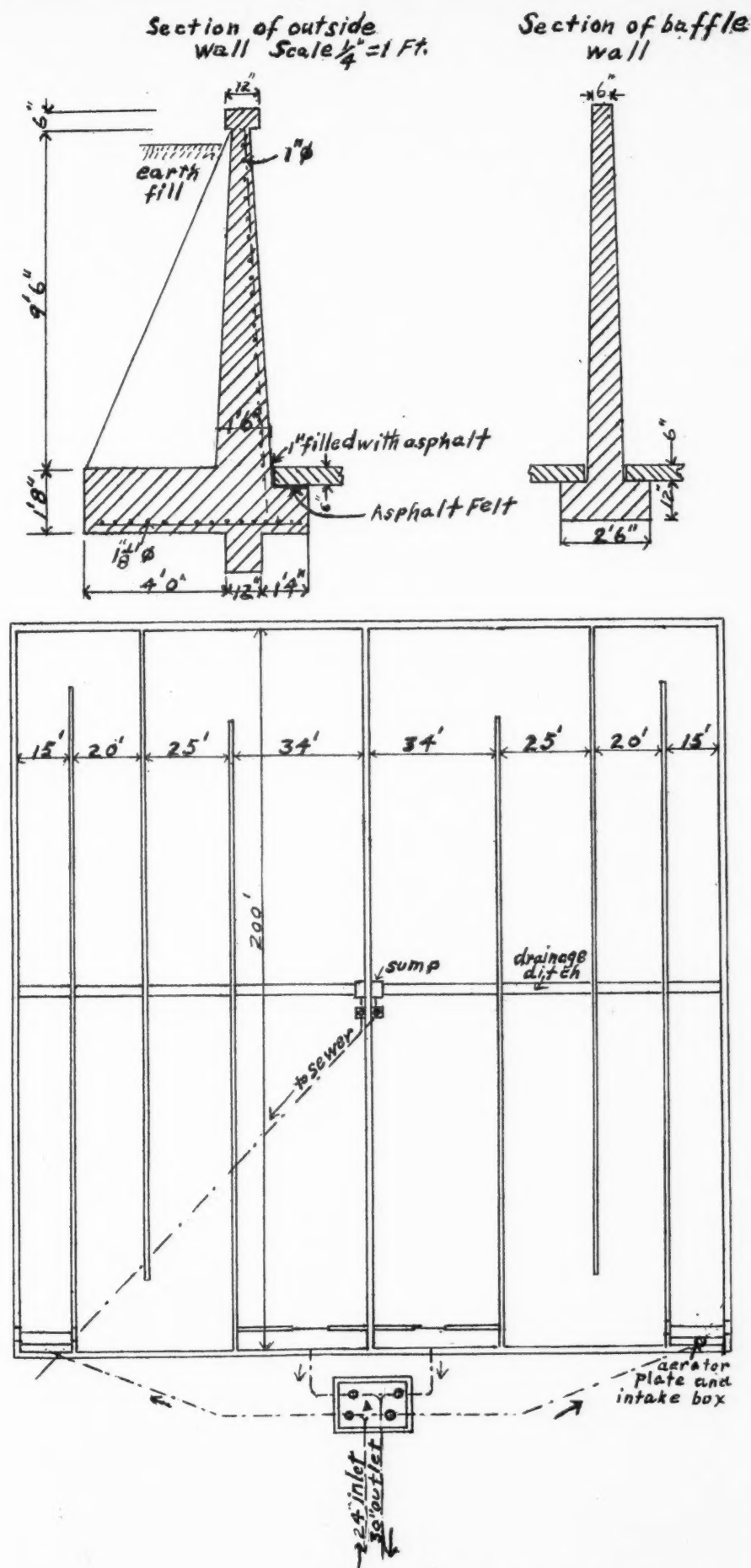
Each compartment is traversed by three baffle walls spaced as shown on the accompanying ground plan. The gradual increase in width of the channel is one of the special features of the basin. By this arrangement of baffle walls the velocity of the water is gradually decreased from inlet to outlet. This arrangement gives added opportunity for settlement by the devious course it forces the water to take. The water has to flow four times the length of the basin, or eight hundred feet, in passing from inlet to outlet.

The inlets are 24 inches in diameter, while the outlets are 30-inch cast iron pipe. Each line is provided with hand-operated gate valves. The valves, four in all, are inclosed in a valve house at the front of the basin.

The 24-inch inlet pipe is connected with a Simplex meter for measuring the quantity of water which enters the basin. The recording mechanism for the meter is situated in the filter room, where the operator can readily learn the amount of water being pumped and regulate the orifices which control the chemicals.

Each inlet discharges into an aerator box. The water rises to the top of this box and flows over an inclined aerator plate into the first channel of the basin. The





PLAN OF SETTLING BASIN, LEXINGTON WATER WORKS.

aerator plates are cast iron and were furnished by the New York Continental Jewell Filtration Co. They have vertical staggered plates four inches high by seven and one-quarter inches long cast on the surface. The plates are tap bolted to their supporting concrete slab. While aerating water, this device also insures a thorough mixing of the coagulant with the water.

An outfall baffle five feet high spans the last channel in front of the outlet pipe. The portion of this baffle wall directly in front of the outlet is composed of six-inch spruce boards, which may be taken out one by one as the basin is being drained. The function of the outfall baffle is to prevent the outlet from creating a current along the floor of the basin and possibly drawing part of the deposit into the outlet and upon the filters.

The construction is reinforced concrete throughout; the outside and central division walls and floor are a 1:2:4 mixture, the baffle walls a 1:3:6 mixture. The outside walls are reinforced near the inner face with one-inch rods. Rods in the footing are one and one-eighth inches in diameter. The reinforcement in the central division wall is double that in the outside walls.

Pilasters spaced twenty feet are placed outside of basin and on both sides of the central wall.

The baffle walls contain no reinforcement except two rods in the free end of each.

The floor is five inches of concrete with a one-inch finishing coat of 1:3 mixture. The steel in the floor is three-eighths-inch rods spaced two feet.

Floor bearings on footings are underlaid with a strip of asphalt felt laid with binder paint.

Expansion is provided for by joints in the walls at the quarter points and at the middle point of the central wall. Steel plates and angles were used in the construction of these joints. Between the floor and all walls is an inch space filled with asphalt.

Two thousand one hundred and fifty cubic yards of concrete and one hundred tons of reinforcing steel were used in the construction.

The arrangement for cleaning the basin is simple as well as very effective. The floor has a drop of six inches from front and back to a central drainage ditch. The drainage ditch is two feet wide. Each drainage ditch leads to a sump pit at the center wall and has a fall of six inches in its one hundred feet of length.

The sumps are three feet square by three feet deep. Leading from the sumps are two twelve-inch cast iron lines, each provided with a gate valve. These lines join and pass under the floor of the basin down the hill to the sewer. The twelve-inch valves have extension stems bracketed to the center wall. They are operated by hand wheels which can be easily reached from the top of the center wall.

Extending around the basin is a two-inch flush line which is connected to the high pressure service. There are four openings from this line through the wall into the basin, each provided with a brass gate valve with hose connection. One man with a hose can clean a basin in about two hours.

The coagulant used is sulphate of alumina, which is furnished by the Pennsylvania Salt Mfg. Co. The chemical plant is situated on the top floor of the pumping station and consists of two circular wooden tanks, seven feet in diameter and five feet high. At the top of each is a dissolving box fitted with perforated wooden racks and spray pipes. The alumina is placed in the dissolving box and as it dissolves it drops down into the storage tank.

The main tanks discharge into small orifice boxes which are fitted with a ball float valve to regulate the flow of the chemical. The orifice tanks discharge into the 24-inch inlet line to the basin. The bottom of the orifice tanks are two and one-half feet above the water level in the aerator boxes, thus giving a gravity feed.

In addition to the sulphate of alumina a small amount of hypochlorite of lime is used. About five pounds are used per million gallons of water. The hypochlorite plant is similar to the alumina plant except that it has a small mixing tank operated by water motor instead of

dissolving boxes. The hypochlorite is introduced into the water after it has been through the basin and before it enters the filters.

If at any time the water has not received the proper amount of coagulant, provision has been made so that it is possible to apply an additional dose to the water just before it enters the filters.

The sulphate of alumina pipe lines are 2 inch lead, the hypochlorite lines are 2-inch black iron.

With the present consumption of between three and four million gallons per day, only one basin is being used.

The flock formed by the chemical action of the water and sulphate of alumina is plainly noticed about half way down the first channel. Thereafter the water begins to clear up and at the end of the second channel the water is almost as clear as it is at the outlet, which shows that the basin can easily take care of at least twice the present pumping rate. This for both compartments would amount to about twelve million gallons per day.

The basin has been in operation about six weeks and has met every expectation. The highest turbidity handled up to the present time was 1,700 parts per million, and the effluent from the basin was clear.

It has been necessary to treat the water in the storage reservoirs twice this season because of the algae growths. The basin seems to be taking care of the algae in a satisfactory manner.

The amount of sulphate of alumina used averages about .50 grains per gallon and it is possible to produce a water free from color.

The contract price for the basin was \$36,287.

The basin was designed by James M. Caird, Troy, N. Y. The contractors were Louis des Cognets & Co., Lexington, Ky.

## WATER WORKS OF SAN DIEGO

**History of Water Supply of the City.—Twelve Reservoirs, Thirteen Miles of Conduit with Eighteen Tunnels, Wood Stave Pipe and Flumes.—Unusual Rock Fill Dams.—Forest Protection on the Watersheds.**

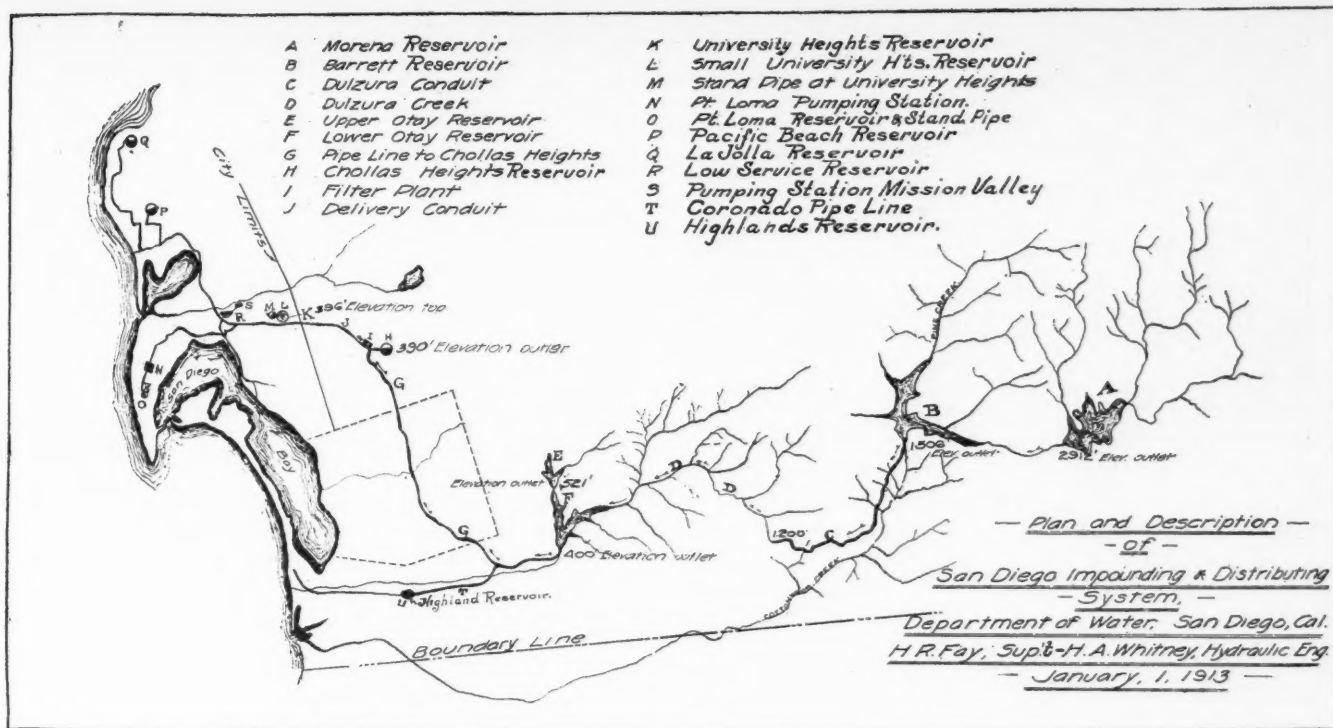
San Diego, California, is situated in what is known as a semi-arid section, where large natural lakes and constantly flowing rivers are not available as sources of water supply, but recourse must be had to large impounding reservoirs in the distant mountains or to underground supplies. San Diego is nearly encircled within a radius of 60 miles by mountains which rise to a height of 6,800 feet above the sea level. During the early days of the city, water from the San Diego river was delivered by vendors in carts and sold from house to house for 25 cents a pail, the price later being brought down by competition to 25 cents a barrel.

In 1873 the city granted the San Diego Water Company a franchise, in return for which it was to receive free 10,000 gallons of water per month for irrigation of parks and whatever was necessary for extinguishing fires. This company began its service with a well from which the water was pumped to two small reservoirs, later supplemented by water pumped from the San Diego river. In 1886 the San Diego Flume Company was incorporated and furnished to the citizens water obtained by an impounding dam at an elevation of 4,500 feet. In 1894 these two companies were merged into one. In 1901 the city taxpayers voted to take over the distributing system of the consolidated company, including mains, pumping plants, reservoirs, water-bearing lands, and equipment owned by the company in the city, \$600,000 of water bonds being issued for the purpose. The

city then pumped its water from the river, but the demand increased beyond the possibilities of this supply, and scarcity of water became a serious drawback to the growth of the city, and in 1905 the city contracted with the South California Mountain Water Company to supply water for ten years at the rate of 4 cents per thousand gallons, the city agreeing to use water from no other source, not even their own pumps, and the company agreeing to furnish all the water necessary up to 7,760,000 gallons per day. Since that time the city has been obtaining water from the mountains which, although very satisfactory, is filtered and aerated to make it as nearly beyond criticism as possible.

In his annual reports of 1910 and 1911, the superintendent of the water department, Herbert R. Fay, recommended that negotiations be entered into with a view to purchasing the system of this company before the expiration of its contract. As this idea was approved by the mayor and council, the water company made a proposition to sell to the city for \$2,500,000 its impounding dams and reservoirs, 13½ miles of conduit, filter plant, etc. This included all its system, except an impounding reservoir, known as Morena reservoir, lying about 1,400 feet higher than any of the others, which also it offered to lease to the city for ten years at an annual rental of \$67,500, with an option to buy it for \$1,500,000 at any time during this period. At the highest limits of the property covered by the \$2,500,000 offer was a reservoir site

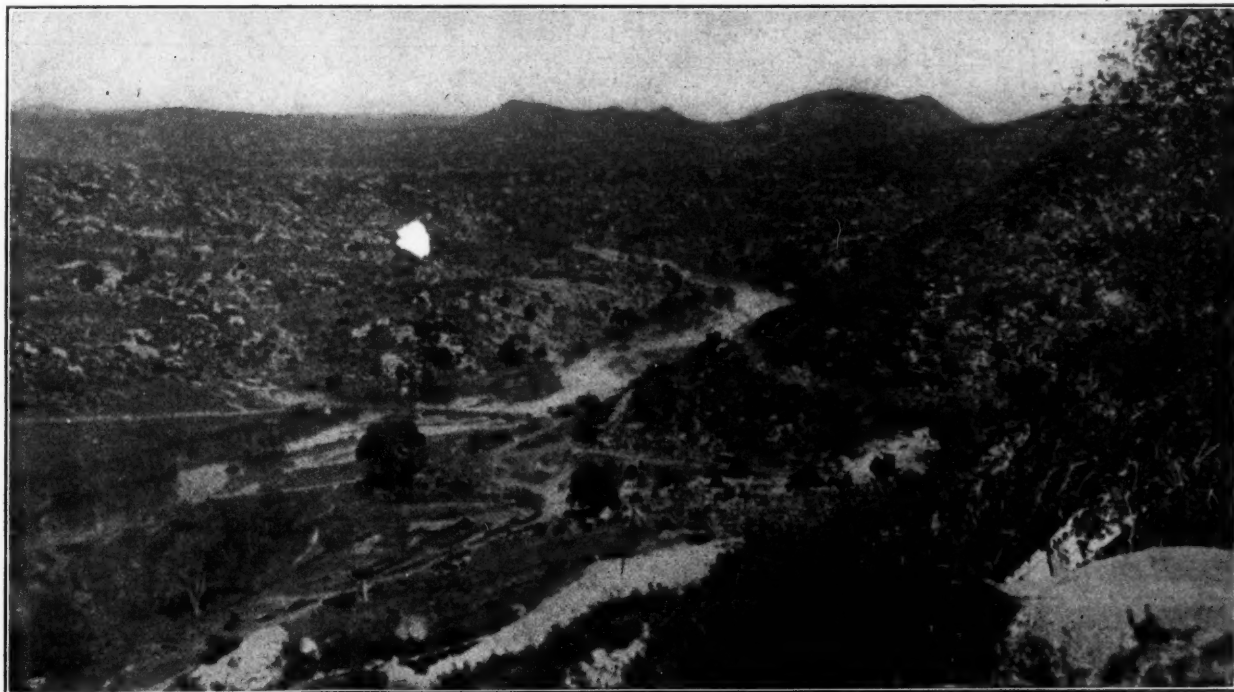




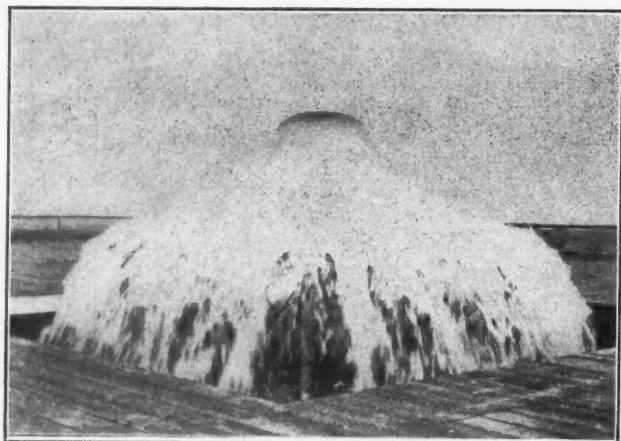
MAP OF SAN DIEGO RESERVOIRS, WATER SHEDS AND PIPE LINES.

known as the Barrett reservoir, where the company had practically decided to build an impounding dam, but no work on its construction had yet been started. These propositions were submitted to a referendum vote on August 15, 1912, and carried with a majority of about 6 to 1. The transfer of the property to the city was made in the early part of this year, and places San Diego in possession of a watershed of 350 square miles and four storage dams having a capacity of 29,180 million gallons, which will be increased by about 15,000 million gallons with the completion of the Barrett dam. In addition to these, there are within the city limits seven reservoirs, and two steel tanks having a storage capacity of 13,252,000 gallons.

At the Barrett reservoir site there is at present a small diverting dam by which the water from Cottonwood and Pine creeks is diverted into a conduit  $13\frac{1}{2}$  miles long which winds round steep mountain sides and through 18 tunnels and discharges into a third creek draining another watershed, down which it flows to the Otay reservoir, the outlet of which has an elevation of 400 feet above sea level. From here the water is carried by a 40-inch wood stave pipe two and a half miles, where it branches into a 36-inch wood stave pipe leading to San Diego, and a 20-inch wood stave pipe to Coronado. The San Diego line conducts the water to a filtration plant fifteen miles beyond the Otay reservoir, and from this a 24-inch wood stave pipe leads to the University Heights



WATER SHEDS OF THE COTTONWOOD.



AERATOR IN OPERATION.

reservoir just within the city limits, passing through a Venturi meter as it enters this reservoir, which has an elevation of 396 feet.

The filter plant has a capacity of 7 million gallons per day, and consists of a battery of ten New York-Jewell horizontal filters, 8 feet in diameter and 20 feet long. The sand used in these was brought across the entire continent, from Cape May, N. J. The filters are cleaned once in 24 hours.

Water is pumped from the University Heights reservoir into a nearby standpipe for supplying the high district in the immediate vicinity, but the most of it flows by gravity into four distributing reservoirs, from one of which the water is pumped into a standpipe for serving another high district. The main service is further divided into a high and low service, between which a difference of 76 pounds pressure is maintained, 6-inch and 8-inch reducing valves being placed on the lines connecting the two systems, which, however, can be connected in case of a large fire.

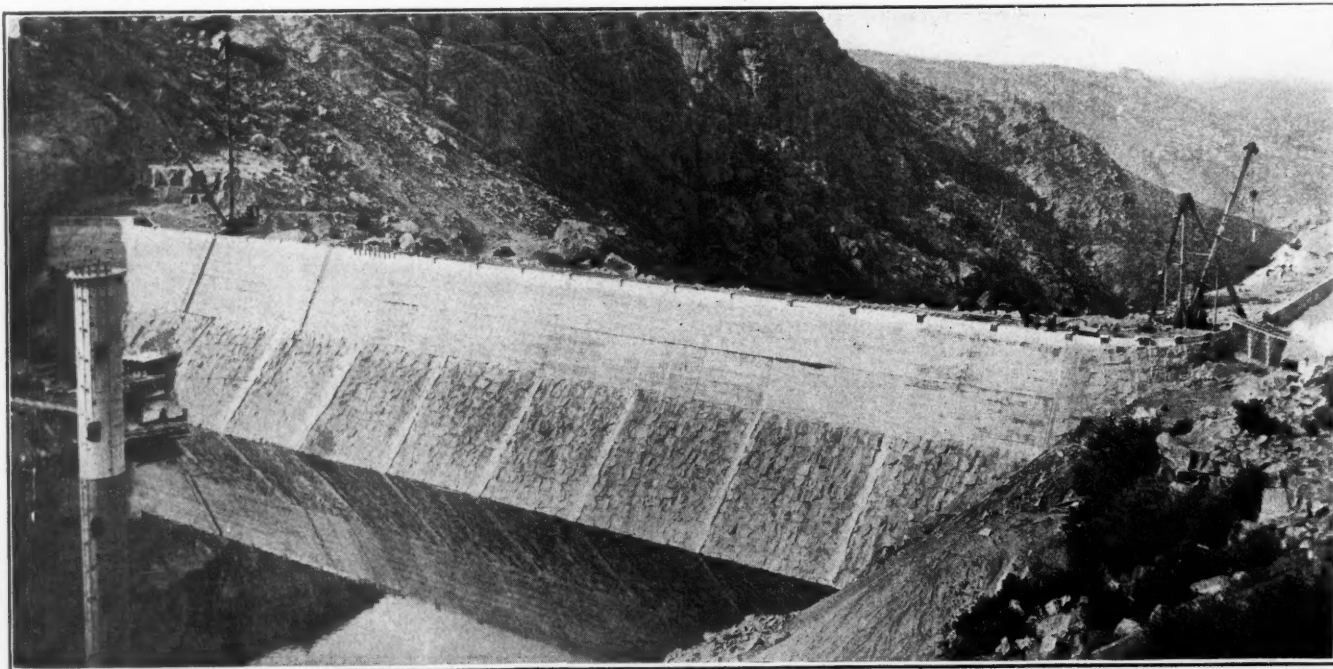
In his description of the physical features of the plant which it was proposed to take over, H. A. Whitney, hydraulic engineer and assistant superintendent of the water department, referred to the dam of the Morena reservoir as being one of the finest pieces of work he had ever seen. It is a rock-filled dam with concrete back having a total height of 265 feet from top to foundation,

112½ feet of this being in a fissure below the original creek bed which developed after the dam was started. The dam is built in a canyon of solid granite. The up-stream face is composed of 6-ton to 10-ton rocks of granite set in concrete mortar on a slope of 9 horizontal to 10 vertical. To this the water face of the dam, composed of reinforced concrete slabs 18 inches thick, is attached by iron rods on one-foot centers anchored into the masonry. The down-stream side is composed of loose rock fill on a slope of 1½ to 1, most of which was hand placed, the crevices being carefully chinked with small stones so that there would be no serious settlement when the dam is filled. Any small settlement which may occur has been provided for by expansion joints between the slabs on the upper face. The top of the dam is 16 feet wide and 500 feet long. Over 300,000 cubic yards of granite were used in the work.

Rising from the up-stream toe of the dam is an outlet tower 15½ feet outside diameter, with an average thickness of 30 inches. In this are four gates, each controlling an outlet into a tunnel drifted in solid rock. Opposite these outlet valves is an independent 24-inch scouring gate used for washing out any accumulation of sediment. The outlet tunnel is 387 feet long, 8 feet wide and 7½ feet high, and discharges into Cottonwood creek below the dam.

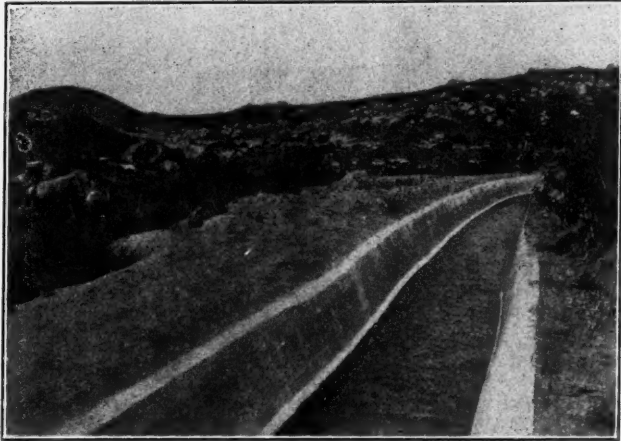
The proposed Barrett dam will be 175 feet high above the bed of Cottonwood creek, and the reservoir will flood 1,370 acres. Borings indicate that it will be necessary to go nearly 100 feet below the surface for a satisfactory foundation, and that the ends of the dam must be carried a considerable distance into the walls of the gorge.

The conduit which receives the water from Cottonwood creek and conducts it to the Otay reservoir is constructed of wood flumes, rock tunnels, and concrete lined aqueducts, there being about 5,700 feet of the last averaging 5 feet wide by 4 feet 2 inches deep. The walls of the aqueduct are 4 inches thick, and wherever there is danger of a slide above, the aqueducts are covered with reinforced concrete slabs. The tunnels are unlined and the bottoms and sides are of rough rock. Wood flumes are used to a total length of 4,490 feet in carrying the water across deep canyons.



MORENA DAM—RESERVOIR PARTLY FILLED.





THE DULZURA CONDUIT.

Mr. Whitney states that the Otay dam, which was begun in 1887 and finished in 1897, is one of the first and by far the largest and best type of loose rock dams in lower California. It is made with a center steel web plate extending the full length and depth of the dam, the thickness of the plates varying from one-fourth to three-eighths inches. These were covered with burlap dipped in hot asphalt after the joints had been thoroughly calked. One hundred and eighty thousand pounds of stone were used in building the dam.

It is realized that the watershed is one of the vital features of the system, and superintendent Fay recommends the extending of the work of the existing city forester to cover these watersheds. The watershed is at present very badly forested, the timber consisting of scattered oak, cottonwood and alder.

In discussing this question, city forester Max Watson states that practically all of the watershed of the system is included in the Cleveland National Forest, of which the government has control. Upon this area the forest service has three regular rangers all the year round and two extra fire guards during the fire season. The government at present is spending about \$7,950 a year on the watersheds in which the city is interested, and has established houses and barns and purchased tools for fire protection to the amount of \$4,000. It, therefore, seems desirable that the city water department and the government forest service should work together. He, therefore, recommends that the city establish a telephone service between the several ranger stations and the water department stations, and that the different ranchers on the watershed be assisted in installing telephone communication with the city under condition that the water works business be always given right of way. He also recommends that automobiles be available for taking men quickly to the watershed in case of fire. Also, that school children in the various schools throughout that section of the country be educated in the seriousness of forest fires and methods of preventing and extinguishing them.

The department has been organized by superintendent Fay as follows: The department will be under the personal supervision of the superintendent with an assistant superintendent. There will be a clerical division to care for the executive work, an engineering division under the hydraulic engineer, division of lands under the forester, bureau of accountability under the chief clerk, bureau of distribution under a general foreman, and bureau of conservation under the supervising engineer. The bureau of accountability has charge of bookkeeping, collections, etc.; the bureau of distribution has charge of that portion of the system within city limits; and the bureau of conservation, of the watersheds, etc., outside of the city

limits. Each chief is a responsible head and personally in charge of his respective division or bureau. An inventory of all properties is taken every six months. All responsible employees are bonded for the safekeeping of properties entrusted to them and the proper performance of their duties. A night emergency system has been installed to care for leaks, and has improved the efficiency of this service.

The bureau of accountability, in addition to general bookkeeping, keeps a correct account of all the property under the control of the department, the exact location of all pipe laid, valves, hydrants, service pipes, etc. The department has compiled and prepared a complete printed list of every known gate, valve, and hydrant in the city and bound them in the form of loose-leaf books. These give the size and location of each appurtenance, and every foreman and official who has any connection whatever with the outside work of the system has a copy.

All service connections are connected to the water mains by means of a corporation cock and a lead connection brought one foot inside the curb line, and a service cock and the meter installed on the same. All services are metered. The department in its repair shops repairs and tests meters and performs such other repairing work as is needed. An auto service wagon is used



WATER WORKS DEPARTMENT REPAIR SHOPS.

by the department, and during 1912 it was on the road almost continually day and night in connection with the installation of 2,241 new services, repairing of mains and other street work. In addition to the auto truck, the department possesses two runabouts and a 4-passenger car; also two twin-cylinder motorcycles and one single-cylinder motorcycle. It is recommended that the city purchase three more auto trucks, two more motorcycles, two additional runabouts, and a 5-ton truck for conveying large material, hauling pipe, etc.

#### LEAD PIPE STOPS ELECTROLYSIS.

The Water Department of Houston, Texas, after experimenting for several years with service pipes in an effort to reduce as far as possible the destruction by electrolytic action which had been going on, as a last resort determined to try lead lined pipe. Previous to this, galvanized pipe which had been used had to be replaced in a large percentage of the services throughout a certain section of the city, in some instances twice a year. The superintendent stated, in his report of 1912, that "the use of lead lined pipe has proved so effectual after a thorough trial that it is not probable we will experience any trouble of this nature after the old pipes have been removed in the electrolysis districts."

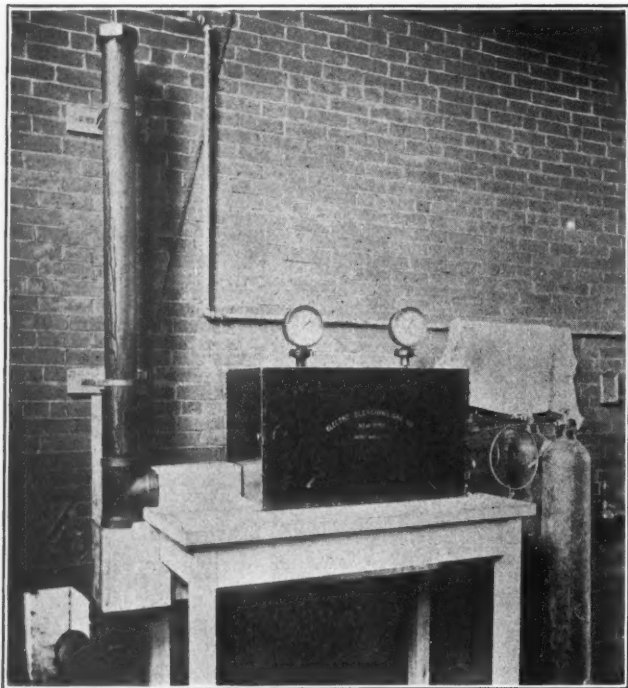
#### AVOIDING WATER SHED POLLUTION.

The Water Commissioners of Springfield, Mass., in their efforts to ascertain promptly any cases of typhoid fever which might pollute the water supply, have adopted the plan of offering a reward to any one who reports a case of typhoid or other intestinal disease occurring on the water sheds of the Little River and Ludlow systems.

## STERILIZING WITH LIQUID CHLORINE

**Two Months' Experience by the Somersworth, N. H., Water Department in Sterilizing a Supply of 400,000 Gallons Daily.**

For about two months the water works department of Somersworth, N. H., has been testing the use of liquid chlorine gas for sterilizing its water supply. Sand filters are used for purifying the water, but it seemed desirable to use some method of sterilizing the effluent. The plant employed was furnished by the Electro-Bleaching Gas Company, which agreed to deliver and set up the apparatus and put it in running order until it operated satisfactorily to the water commissioners, and to remove it at no expense to the city if it did not give satisfactory results. The superintendent of the water works, John Parsons, writes that the results at this date appear to be very satisfactory. The plant itself, he writes, "is very simple in construction, very easily operated, requiring no skilled labor, and the expense is nominal. As to the chlorine used, two pounds at 10 cents a pound purifies 500,000 gallons of water, which is more than the daily consumption. We and the public are greatly pleased with the result since it has been in operation—about two months. The color of the water has not been greatly improved, but the last four analyses



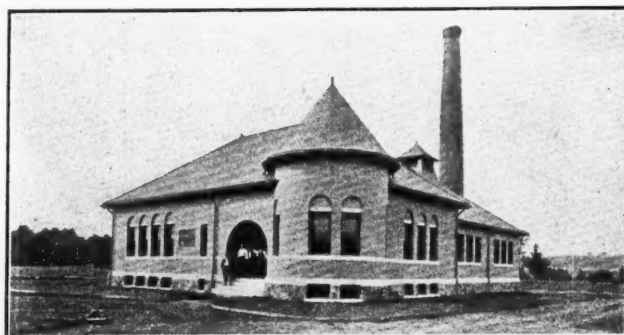
CHLORINE CYLINDER, APPARATUS AND TOWER.

made by State Chemist Howard show a very low bacteriological count, with no colon bacilli. We are convinced, by actual use, of the efficiency of the chlorine treatment to furnish absolutely healthy water for our city.

"For the removal of bacteria from the water of our city after it has passed through the sand filter, we chose liquid chlorine rather than the hypochlorite method largely in use for this purpose, since the latter involves the use of a powder which renders the water hard and may appreciably affect the taste. Also, there is an uncertainty about the use of lime, as the minute the barrel is opened a waste of its strength begins, and just what diminution of strength there is from day to day is hard to estimate. With the liquid chlorine treatment, the process does not require the skill and care necessary to

the proper use of hypochlorite. The strength and efficiency of the chlorine are certain and constant. We are exposing it to the most severe tests which can be given, and to the most critical investigation by chemists, and are much pleased with the results as we find them.

"There are some changes and repairs to be made in the



SOMERSWORTH PUMPING STATION.

gauges and gateways of our chlorine plant, after which we think all will be in perfect condition—water filtration plant, liquid chlorine gas plant, and the water itself."

The apparatus he states to be of strong construction, especially adapted for the use of chlorine gas in quantities of from one to two pounds per million gallons of water, which can be varied through a wide range by a simple adjustment; the amount needed depending upon the condition of the water to be treated.

Under date of May 6th, Charles D. Howard, Chemist of the Laboratory of Hygiene of the New Hampshire State Board of Health, reported concerning the water taken from the screen well at the river, as follows: Odor, slightly earthy; color, 0.65; turbidity, moderate; free ammonia, .001; albuminoid ammonia, .00166; nitrates, .010; nitrites, .000; chlorine, .35; total solids, 5.0; fixed solids, 2.7; hardness, 0.9; iron, .05; alkalinity, 1.5; oxygen consumed, .51; colon bacilli, positive in 1 c. c. Four samples of purified or treated water, one from the station and three from other places in the city, were analyzed for bacteria and showed 18, 24, 16 and 8 bacteria per c.c., respectively, coli being absent from all four. On May 15th Mr. Howard reported on four samples, one the raw water, which showed 166 bacteria; tap water in the boiler room which showed 85, tap water in Rochester street showing 23, and tap water in Grove street showing 8. All of these were negative for colon bacilli. On May 21st samples from the same sources showed 84, 27 and 32 bacteria, respectively, with no colon bacilli in 1 c. c. in any of the samples.

During the last week in January, the same company installed a plant in Wilmington, Delaware, which we presume was much the same as that being used at Somersworth, although we understand that some minor improvements have recently been made in the plant as used at Wilmington. The Wilmington apparatus consists of a series of pipe coils for connecting four cylinders to a manifold, upon which is placed a specially prepared pressure gauge for determining the initial pressures. Beyond this gauge two pressure regulating devices are installed, the first being used primarily to reduce the initial cylinder pressure to a predetermined maximum, and the second for regulating the pressure through a range sufficient to give the desired discharge of gas.

To a branch outlet on the line between the last regulator and discharge outlet there is attached a low pres-



sure chlorine gauge which indicates the rate of flow of the gas. The cylinders rest upon an ordinary platform scale by which is determined the quantity of gas used during any period of time. The gas is conducted by chemically prepared hard rubber tubing to an absorption tower of special design, constructed of stoneware composition which resists the chemical action of the gas during the absorption process.

After passing the measuring device, the chlorine gas is admitted near the bottom of this tower and in passing upward is brought into contact with a very small quantity of water in the form of spray. The affinity of the chlorine for the water results in an immediate absorption, and the water with the absorbed chlorine is drawn out at the bottom of the tower and applied to the water to be treated.

Liquid chlorine is purchased in tubular steel cylinders approximately 8 inches in diameter and 60 inches high and containing from 100 to 110 pounds of chlorine, almost chemically pure. The pressure in these cylinders varies with the temperature from 54 pounds per square inch at 32 degrees to 125 pounds at 85 degrees. Numerous difficulties were encountered in the endeavor to perfect an apparatus for efficiently controlling and measuring the flow of this liquefied gas, owing to the variable pressures existing and to the highly corrosive properties of chlorine. The mechanism described is therefore constructed of materials particularly adapted for use in this connection and it would appear, from information at hand, that the control at the plants mentioned has been satisfactorily accomplished.

#### WATER WASTE IN KINGSTON.

In its report for the year 1912 the Board of Water Commissioners of Kingston, N. Y., makes the unusual statement that the wasting of water, or rather the allowing of water to run continually in cold weather, is to be commended in that city. Quoting from the report: "In the bitter cold weather a great many of the mains are within the frost line and it is necessary to have the water running in order to prevent the pipes from freezing. In view of the physical defect in the original installation of the system (laying the mains in too shallow trenches) the Board has not enforced the rules against allowing the water to run to waste in bitter cold weather, but has considered that it was necessary. Should the time ever come when the supply is not sufficient to meet the needs of the city, and it is necessary to meter all residences, it will also be necessary to lower the mains over the greater part of the city, at an expense too great to contemplate in this report. . . . To meter the entire city would cost approximately \$80,000, and would require lowering the mains in addition."

We do not recollect ever having seen in any other report the approval by water commissioners of the too common practice of consumers in unmetered cities of allowing water to flow during cold nights to prevent the freezing of service pipes and house plumbing which are improperly laid and protected.

#### KEY WEST WATER WORKS.

The water works situation of Key West is a more or less unique one. The population of about 25,000 occupies nearly all of a rather small island on which the rainfall averages about 38 inches. Attempts have been made to obtain water by wells, but only very brackish water has been obtained, and the citizens rely entirely upon cisterns for all the water used for domestic purposes. There is, however, a water works plant containing about eight miles of pipe, on which are 110 hydrants. The supply is obtained from a well 2,300 feet deep, from

which there was used during the fiscal year ending April 30 a little over 25 million gallons, or an average of about 70,000 a day. The water is used for flushing streets and sewers, as well as for fire protection, and is supplied to the U. S. Naval Station and the Marine Hospital for these purposes.

The character of the water calls for much greater care in maintenance than is required with potable water. The superintendent, H. S. Wetmore, writes us that it is necessary to keep one man inspecting hydrants and valves continuously, as they will corrode, so that they cannot be opened if left unattended to for a few weeks. There are 67 surface connections for flushing, and for these he finds it necessary to use AA extra heavy lead pipe, as galvanized iron pipe has been found to last not more than six months at best.

Mr. Wetmore thinks that he must hold the record for cost of pipe laying, as he dug, laid, calked and backfilled 9,900 feet of 6-inch and 500 feet of 8-inch pipe last year, including fittings and fire hydrants, at an average cost of 18½ cents per foot. Prisoners were used to do the ditching; the regular water works force for other work.

#### WATER METERS IN HOUSTON.

In the 1912 report of J. B. Williams, superintendent, and Robert L. Jones, chairman, of the Water Committee of Houston, Texas, figures are given to show that during the year covered by the report, the consumption was about 26 per cent less than it had been the year previous, and in calling attention to this fact, Mr. Williams makes the following observation: "This fact deserves more than casual notice, as it is an economy that means more to the city than is represented in mere figures. It is a supply of pure water held in reserve for future use, insuring at the same time a lease upon the practical capacity of the wells for a greater period of time. When it is recalled that numerous cities two years ago suffered from the lack of water, and even today many of these cities are attempting to solve the problem of a pure and adequate supply, the people of Houston may be congratulated that no such condition confronts them." Figures given in the report show that the flow from the wells which are furnishing the supply for the city is only about one-third what it was when the wells were first sunk, an average of twelve years ago.

This reduction in consumption is attributed by the superintendent to the installation of meters, and the following table is presented which, he claims, "proves conclusively the fact that to meters more than to any other factor credit is due for checking wilful or neglectful waste of water. A pumpage of 141 gallons per capita in 1907 has been reduced to 53 gallons per capita today, without depriving any person of this essential element.

#### EFFECT OF METERS ON CONSUMPTION.

Year.	Number of meters.	Percentage of consumers metered.	Average per capita pumpage.	Population, city census.
1907.....	108	.015	141	73,017
1908.....	303	.04	122	79,464
1909.....	1,903	.21	106	82,542
1910.....	4,556	.48	82	95,930
1911.....	8,131	.82	53	109,594

In 1912 the number of meters had been further increased to 10,400. The cost of meters and of setting are shown by the following table:

#### COST OF SETTING.

Size.	Number set.	Cost of meter.	Average cost of setting.	Total average cost.	Total cost of setting.	Total cost.
5"	3,163	\$8.00	\$2.45	\$10.45	\$7,749.35	\$33,053.35
3 1/2"	451	12.00	2.65	14.65	1,195.15	6,607.15
1"	68	16.00	2.60	18.60	176.80	1,264.80
1 1/2"	11	30.00	2.90	32.90	31.90	361.90
2"	17	40.00	3.95	43.95	67.15	747.15
3"	5	80.00	6.85	86.85	34.25	434.25
4"	3	160.00	9.75	169.75	29.85	509.25
Total...	3,718	....	....	....	\$9,284.45	\$42,977.85



## INTERFERENCE WITH PIPES

### Right of Municipality to Change Location of Mains of Water or Gas Company Generally Sustained When Change Is Unavoidable.

By J. SIMPSON.

It is a general rule that, in the absence of any contract provision, or any provision in the franchise granted to a gas or water company, a municipality is not liable to such a company for the expense incurred in the unavoidable changing of the location of the company's pipes because of the laying of sewers or other necessary public works. *Sedalia Gaslight Co. v. Mercer*, 48 Mo. App. 644; *Portsmouth Gas-Light Co.*, 65 Me. 233, 19 Atl. 1002 (extending the immunity to the contractor for the sewer); *Brunswick Gas Light Co. v. Brunswick*, 92 Me. 493, 43 Atl. 104; *Belfast Water Co. v. Belfast*, 92 Me. 52, 42 Atl. 235. The question has been the subject of litigation in the state and federal courts and has been passed upon by the United States Supreme Court.

The Drainage Commission of New Orleans, having adopted a system of drainage, found it necessary to change the location, in some places in the streets of the city, of the gas mains and pipes laid by the New Orleans Gas Light Company. The parties agreed that the necessary charges should be paid by the gas company, which should keep an account of these, and the matter of where the expense was to fall should afterwards be submitted to the courts for final adjudication. This was done and the matter ultimately reached the United States Supreme Court. The nature of the gas company's franchise to use the streets was considered by the court. According to the original grant, the pipes were to be laid in the streets "having due regard to the public convenience," and in a subsequent grant "in such manner as to produce the least inconvenience to the city or its inhabitants." The Supreme Court held that the gas company acquired no exclusive right to the location of its pipes in the streets; and the city made no contract that the gas company should not be disturbed in the location chosen. In changing the location where necessary the Drainage Commission was acting in the exercise of the police power of the state, for a purpose highly necessary in the promotion of the public health. Only the necessary expense of the change of location had been thrown upon the gas company. None of its property had been taken. It was held that the injury sustained by the gas company was *damnum absque injuria*. *New Orleans Gas Light Co. v. Drainage Commission of New Orleans*, 197 U. S. 453, affirming 111 La. Ann. 838, 38 So. 729. In like manner, a water company, compelled to relay its pipes, which it had laid under a contract with the city to make way for a sewer, was held to have no claim against the city for the cost thereof, unless it could be shown that the city's action was unreasonable or malicious. *National Water-Works Co. of New York v. City of Kansas*, 28 Fed. 921. The contract in this case contained a reservation in favor of the city as to the streets where pipes might be laid. For that reason it was distinguished in a subsequent case, *Moore v. New Orleans Waterworks Co.*, 114 Fed. 380, where it was held that the act of the drainage commission in requiring the removal of the mains and pipes of a waterworks company was a taking and damaging of private property for public purposes, for which, under the Louisiana Constitution, just compensation must first be made. In the latter case the contract of the waterworks company with the state and city seems to have contained no such reservation.

In *Re Deering*, 103 N. Y. 361, it was not shown that, although authorized by statute to lay its pipes through

the public streets, the gas company did not take the risk of their location, and it was held that it should be required to make such changes as public convenience or security required, at its own cost and charges.

The contractors for the laying of a sewer in a village street contracted to make all necessary provisions to protect gas pipes; to be responsible in damages for all their operations, and if injury occurred in digging about the gas pipes, to pay the cost of repair. It was held in an action by the gas company against the contractors that this provision inured to the benefit of the gas company, and it was not a sufficient defense to say that the contractors had used reasonable care, if the gas pipes had been injured. *Glens Falls Gas Light Co. v. Van Vranken*, 11 N. Y. App. Div. 420. The same conclusion was arrived at in *Re Houghton*, 20. Hun. (N. Y.) 395, where the contract for the construction of a sewer bound the contractor to pay all damage arising out of the nature of the work, and the pipes of a gas company were damaged.

A water company had a right under its charter to lay its pipes through the streets of a city "in such a manner as not to obstruct or impede travel thereon." In an action against the city for injury to a pipe which it had uncovered and exposed to frost in picking one of its streets, it was held that the city retained the right to repair its streets in the ordinary manner. In the absence of any improper method, it incurred no liability to the water company. *Rockland Water Co. v. Rockland*, 83 Me. 267.

The rule applies to other public works, such as changing the grade of streets. Where a water company sued a city for the expense of lowering and relaying its pipes, which it had been compelled to do by the grading of the streets on a lower plane, it was held that the city was not liable, the water company's right being subject to the power of the public authorities to keep the streets in condition for public use, and to change the grades. *Stillwater Water Co. v. Stillwater*, 50 Minn. 498. Here there was a contract to lay pipes "so located as to best secure the fire protection of the city," but it was held not to be breached by damage caused by the lowering of the grade. See also *Gas Light & Coke Co. v. Columbus*, 50 Ohio St. 65; *Roanoke Gas Co. v. Roanoke*, 88 Va. 810, 14 S. E. 665; *Scranton Gas & Water Co. v. Scranton*, 214 Pa. St. 586.

In *National Water Works Co. of New York v. City of Kansas*, 20 Mo. App. 237, there was a contract for laying the plaintiff's water pipes which provided that the water company should not be required to lay pipes on any street, etc., on which the grade should not have been established. The company claimed that it was by this contemplated that when once put down, the pipes should be permanent; but it was held that the contract did not attempt to impair the right of the city to change the grade of the streets, and it was not liable for the cost of lowering and relaying a water pipe.

In *Jersey City Water Commissioners v. City of Hudson*, 13 N. J. Eq. 420, the water company was authorized by statute to use the soil under the public roads, and had laid its pipes across the streets of a city. It was held compelled to lower them to conform to a new grade. A statute giving to "an owner of land adjoining a highway or town" the right to compensation for damage to his property by the grading of a street does not give a water company any claim for compensation in such circumstances. *Jamaica Pond Aqueduct Corporation v. Inhabitants of Brookline*, 121 Mass. 5. Under a very similar statute, however, giving compensation to owners of lands over which any graded street might pass, "and any

person damaged" by the "altering" of the street, the South Carolina Supreme Court holds that a city is liable to a water company for damages caused by the city changing the grade of a street, and such damages are not *damnum absque injuria*.

A contract for the construction of a waterworks system provided that if the grade of any streets should be changed by direction of the city, the city should pay the expense of changing the grades of the water company's pipes. It was held that the contract did not take away the right of the city to require the company to lower some of its pipes, which passed through and obstructed sewers in some of the streets, the grades of the streets not having been changed. *Montgomery v. Capital City Water Co.*, 92 Ala. 361, 9 So. 339.

## MUNICIPAL OWNERSHIP OF WATER WORKS

### Arguments in Favor of It Advanced by Council Committee of Livingston, Montana.—Quality of Service.—Politics.—Rates.

The city of Livingston, Montana, has for several years been considering the matter of a municipally owned water works, and as the franchise of the company which was furnishing the city's supply expired in 1911, efforts have been made to arrange for the purchase of the private plant. The City Council appointed a water committee and also arranged with Burns & McDonnell, consulting engineers, to make an appraisal of the property. The water company was requested to appoint an appraiser also, but failed to do so. The company, however, gave the engineers access to all parts of the plant and supplied them with data and information concerning its physical features, but did not permit an examination of the books of the company. On March 6th of this year, the engineers brought this appraisement up to date, giving the value as \$148,489, after allowing a depreciation of \$17,074 from the cost of duplication. The engineers also prepared plans and estimates of cost of an entirely new municipal plant, and of the improvements which would be desirable in case the existing plant was purchased. These facts and figures were published a few weeks ago by the City Council in its desire to fully inform the people on the subject, with the idea that the people might vote intelligently on the project.

In this pamphlet, in connection with the matters above referred to, there was published a statement of the advantages of municipal ownership. In spite of the many years of discussion of this subject, it is one which is continually recurring as the question comes up in different cities or before newly elected officials, and we therefore quote this argument as being of more or less general interest. The quotation is as follows:

There are still a few people who fail to recognize that a municipality can perform any of the ordinary functions of an individual, and chief among these to demonstrate their ability to own and operate water works plants successfully. A municipality conducting a water works plant must supply good, pure water, and they are in position to provide it whenever the citizens demand improved conditions, and this is not always true of a privately owned plant operating for revenue and often controlled by bond holders, investors and individuals who seldom live in the municipality where the water works plant is operated. It is looked upon as a dangerous policy to permit one individual, or the bond holders, who may reside in another state, to control and manage a utility which means so much to the health and

prosperity of the city. If the conditions are unsatisfactory from the health standpoint, it is difficult to secure immediate action or any improvement, as the individuals do not respond to the needs of a city in a privately owned plant. Oklahoma, one of the newest States, profiting by the experience of older communities, has granted few franchises, there being but one privately owned plant and over one hundred and fifty municipally owned plants, yet we presume there are many people who would say that the 150 municipalities had gone wrong and only one city in that state is following the proper course. Nebraska, with 152 water works plants, the cities own them all with the exception of 6. Kansas has 16 privately owned plants out of a total of 168, and of the 16, two are now in litigation in an effort to get from under private control.

The desire for municipally owned utilities is not confined to the smaller cities, as is shown by the fact that of thirty of the largest cities all but three are municipally owned, and two of these, Denver and San Francisco, have been in litigation for the last fifteen years in an effort to acquire their water works plants at a fair value.

A favorite argument used by opponents to municipal ownership has been that a municipal plant becomes the object of political patronage, while, as a matter of fact, the reverse has been the case, and where politics enter into municipal affairs it is almost always due to the fact that some water and lighting plant or other utility has a franchise needing extensions or renewal, and the owners of the private plant endeavor to elect City Councilmen friendly to their interests. If the franchise is not expiring, they frequently desire to keep their friends on the City Council with a view of protecting their interests. The experience of American municipalities has almost universally been that wherever all the utilities are owned by the municipality, the elections are non-partisan, and efficiency has been the goal toward which the cities have been striving, instead of mixing their utilities in politics.

A very large portion of municipally owned water and lighting plants throughout the country are operated by non-partisan boards, similar to our Boards of Education, their terms of office expiring at different times in order to keep in power men of experience in managing the utilities. Many of these municipalities of about the same population as Livingston furnish water for house use at rates from 75 cents to \$1.50 per month, furnishing the very best fire protection and water of excellent purity.

The water rates of municipal water works plants are usually made just sufficiently high to operate the plant, pay interest on the bonds, operating expenses and keep up the plant in good condition, and when a surplus accumulates, the rates are usually lowered, for it is not the object of a municipal plant to make money out of the undertaking, but to supply water at the cost of production, while the object of a privately owned plant is to make revenue out of the business and interest on the investment, consequently the rates of privately owned plants are usually from twenty to fifty per cent. higher than the rates of municipally owned plants.

In addition to high rates for private consumers' use, the city is frequently charged high rates for sewer flushing and manufacturing purposes, which often prevents industries locating in a municipality where the water works plant is owned by a private company. Many municipalities have a policy of offering to manufacturing industries water at the cost of production, which is as low as any industry could ask for any commodity. Many cities have built up large industrial enterprises through supplying water at from three to four cents per



thousand gallons to industrial enterprises, and this is only possible where the city owns the water works plant. For example, Toledo, Ohio, supplies its manufacturing institutions with water at  $3\frac{1}{2}$  cents per thousand gallons; Saginaw, Michigan, 4 cents per thousand gallons; Harrisburg, Pa., 3 cents per thousand gallons; Detroit, Mich.,  $2\frac{1}{4}$  cents per thousand gallons; Seattle, Wash., 3 cents per thousand gallons; Buffalo, N. Y., 2 cents per thousand gallons; Kansas City, Mo.,  $4\frac{1}{2}$  cents per thousand gallons; Salt Lake City, Utah,  $3\frac{1}{2}$  cents per thousand gallons. Many of the smaller municipalities of the size of Livingston have adopted the same policy, supplying manufacturing institutions at low rates, among these being Austin, Minn., 3 cents; Marshalltown, Ia., 6 cents.

The question arises whether or not a city can own and operate the plant properly under these low rates. This question is frequently raised by the officials of private companies, who often contend that they are not making any money out of the business, yet these same individuals invariably seek to have the contract renewed and continue the business, while if the business were unprofitable, they would not be so anxious to secure renewal of contract and desire to hold on to the plant at any cost. It is safe to say that the city can operate a utility of this nature as satisfactorily as a private company, and the time is fast approaching when there will be no privately owned plants.

With good, pure water, the city of Livingston can look forward to a large increase in revenue from the water works plant, even though the rates are reduced, and this would be due to the fact that it would have filtered water for all uses. This is well illustrated by comparison of two cities in Ohio of about the same population. The City of Niles, Ohio, in 1910, with a population of 8,000, had an income from the water works plant of \$8,758.00. This low income was due to the fact that the water was unfiltered and not desirable for drinking purposes. Warren, Ohio, with a population of 10,000, had good, pure filtered water, taken from the river, and that city enjoyed an income of \$38,783.00. The excellent financial standing of the latter plant was due in a large measure to maintaining an excellent quality of water.

It may be the opinion of some that the interest on the bonds, \$225,000, would be a hardship on the citizens. The fact is, however, that the revenue from the plant would be sufficient to pay the interest on the bonds and the operating expenses, and there would therefore be no increased taxes due to the bonds being voted. The water rates would more than offset the interest on the bonds and the revenue from the plant would make it more than self-supporting. Voting bonds for a revenue-paying utility like a water works plant is quite different from paving or sewers, or some improvement that is not a revenue-producing utility.

At Carthage, Missouri, an appraisalment of the plant was made by the same engineers who made the appraisalment of the Livingston plant, and that city is now enjoying a municipally owned plant. Their population is 11,000 and the new plant has been operating a little over two years and has paid over \$36,000 of the principal, and the city now has \$15,000 in the treasury to apply toward the paying off of their bonds. The new plant cost \$220,000; and in less than ten years at the rate the system is now being operated, the entire plant will be entirely paid for. The rates will then be lowered to the cost of producing water. The system is supplied with water from deep wells. It is of remarkable purity, and C. D. Platt, president of the Board of Public Works, advises that "no one would think of going back to the days of muddy water, high rates and poor fire pressure."

### WATER WORKS NOTES.

In the annual report for 1912 of Superintendent Henry E. Perry of Dover, N. H., it is stated that although the average life of plain wrought-iron pipe when in the ground is estimated to be fifteen years, the larger part of that class of pipe used in Dover has been in service more than twenty years, and judging the general condition from evidence obtained by extended investigation, he sees no reason why it will not last twenty more. The service pipes are largely 1-inch wrought-iron pipe cement-lined. Occasionally one of these is cut by electrolysis, but most of the trouble is found either in the lead bend or gooseneck where it joins the corporation, or inside the cellar wall where it is eaten with rust.

The 6-inch supply pipe to a hydrant in the main street was broken in a peculiar manner last year, the cement walk having been lifted by the frost and carrying with it a fire hydrant which was firmly cemented in it; the force exerted on the hydrant being so great as to break off the connection at its foot. From this experience Mr. Perry calls attention to the desirability of leaving a small clearance between a fire hydrant and a cement walk which is laid around it.

A number of meters in Dover which have been in use for more than twenty years were found last year to be under-registering, and it is expected this year to test all meters which have been in use more than ten years. There were in use 1,430 meters, of which 259 were reset last year, only 19, or less than 1.4 per cent., being replaced with new ones. This would seem to be a very good record considering that a number of the meters were installed more than twenty years ago, and the ages of the others varied from that to one year. The superintendent states that the meter system is giving good satisfaction, and is keeping down the waste of water without restricting its legitimate use.

Eight years ago the town of Revere, Mass., purchased the water works plant of a private company, and the annual report made on January 31st shows the progress which has been made by the water commissioners. "Eight years ago there were 106 meters in the system; today there are 1,605. Eight years ago there were 127 hydrants; today we have 228. In the eight years there has been saved to the town over \$3,200 in hydrants; rates to takers have been reduced 20 per cent.; the plant has been improved by replacement work and extensions to the amount of \$105,000. At the same time the debt has been reduced from \$370,000 to \$279,000." In addition, figures are presented to show that the amount of cast-iron water mois has been doubled in that time, and  $6\frac{1}{2}$  miles of cement lined pipe has been replaced with cast iron.

Concerning the gradual removing of the cement-lined wrought-iron pipe, Superintendent Albert S. Burnham says: "The use of wrought-iron pipe of any kind in some of the soil in Revere will have to be discontinued, as it will last but a short time in marshy soil that is impregnated with salt, whether clay or loam. The rotting of small pipe already laid in several localities will make necessary its replacement with some other metal."

Like most other cities in New England, many mains were frozen by the extreme cold weather of January, February and March, 1912, although Revere did not suffer as severely as many of the neighboring cities. In thawing out the mains, electricity was used in many cases and found to be more economical, both in time and expense, than any other method. Mr. Burnham states, however, that it is not practicable to use an electric current for this purpose on cement-lined wrought-iron pipe. The electrical thawing was done by the employees of the local lighting company.



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## CHANGE OF ADDRESS

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Contributions suitable for this paper either in the form of special articles or of letters discussing municipal matters, are invited and paid for. Subscribers desiring information concerning municipal matters are requested to call upon MUNICIPAL JOURNAL, which has unusual facilities for furnishing the same, and will do so gladly and without cost.

JUNE 12, 1913.

## CONTENTS

Water Works of Niagara Falls. (Illustrated).....	797
Trenton's New Filtration Plant.....	800
Madison Water Works Operation.....	801
St. Louis Water Tower. (Illustrated).....	803
Cleaning a Reservoir Site.....	803
Settling Basin at Lexington. (Illustrated). By H. W. Southard.....	804
Water Works of San Diego. (Illustrated).....	806
Lead Pipe Stops Electrolysis.....	809
Avoiding Water Shed Pollution.....	809
Sterilizing With Liquid Chlorine. (Illustrated).....	810
Water Waste in Kingston.....	811
Key West Water Works.....	811
Water Meters in Houston.....	811
Interference With Pipes.....	812
Municipal Ownership of Water Works.....	813
Proposed New Constitution of the American Water Works Association.....	815
Water Works Tables in This Issue.....	815
Meters, Consumption and Rates.....	815
Water Meters in Wilmington.....	816
Water Works Statistics; Tables.....	817
News of the Municipalities. (Illustrated).....	826
Legal News—A Summary and Notes of Recent Decisions.....	835
News of the Societies.....	836
Personals.....	837
Municipal Appliances. (Illustrated).....	838
Industrial News.....	840
The Week's Contract News.....	841

## Proposed New Constitution of the American Water Works Association.

The most important business to be considered by the American Water Works Association at its convention beginning June 24th is the adoption of a new constitution which is proposed by a committee appointed last year for this purpose. Some minor points are, we think, open to mild criticism, but in general the constitution is an improvement over the present one. Among the changes embodied in this constitution is the substitution of one Vice-President for five as at present; the creation of a board of six trustees, which serve as members of the Executive Committee; direct nominations of officers by nominating ballots, after the method common in the selection of commissioners under municipal city government; the election of officers by letter ballot. An echo of national politics is also suggested by the provision that Presidents and Trustees may not serve three consecutive terms. The Secretary, Editor and standing committees are to be appointed each year by the outgoing Executive Committee. The Finance Committee of three members, presumably widely scattered geographically, must audit and approve all bills before they are paid.

Another important feature is the provision for Local and National Sections, each to have its own organiza-

tion under the general oversight of the Executive Committee, each Local Section to charge its expenses to the association treasury up to a limit of 25 per cent of the annual dues paid to the association by the members of the Local Section. The presiding officer of each section would be an honorary Vice-President of the association.

Aside from these matters, we believe that the proposed constitution does not vary, except in minor details, from the present constitution and practices of the association. The Trustees are assigned no duties except to serve as members of the Executive Committee, and practically take the place of the present Vice-Presidents, except for their three-year tenure of office. Appointments by outgoing Executive Committees are unusual; and the fact that such appointments include three members of the succeeding Executive Committee and that four Trustees and two other members hold over (this accounting for nine of the fourteen members) would tend to prevent sudden changes in policy. The danger of the growth in the society of an oligarchy difficult to depose suggests itself.

We hope that the idea of Local Sections, or subsidiary societies, will be tried. The enthusiasm in and good rendered by a society whose members are widely scattered is greatly diminished by infrequency of meetings, and Local Sections would seem to promise a remedy for this.

## Water Works Tables in This Issue.

We present this week our customary annual tabulation of data collected by us directly from the water works superintendents and other officials (of whose co-operation in the work we wish to express our full appreciation), covering the last fiscal year. Statistics are still coming in—many from cities whose fiscal years have ended quite recently, and who consequently have been unable to compile them sooner—and supplementary tables giving these will be published in a week or two, as will further tables giving deductions from these figures, such as consumption per capita and per consumer; number of hydrants and of services per mile of main, percentage of services metered. Such deductions it seems better to postpone until the data are as complete as possible. Other statistics also are in course of preparation and will be published shortly, such as the number and kinds of plants for filtering or otherwise treating water; number and kinds of appliances (other than fire hydrants) for filling sprinkling carts, etc.

Effort has been made to avoid all errors of both compilation and typography in these tables. If any are discovered by our readers we will appreciate their informing us of the corrections necessary, and these will be published in a later issue.

In many cases superintendents have frankly stated that they do not know how many valves, services, hydrants, etc., there are in their systems; in many others we imagine that failure to give the figures is a tacit confession of such lack of information. We are glad to see, however, a growing appreciation from year to year of the desirability of definite knowledge on these points.

## Meters, Consumption and Rates.

The purpose of installing meters in the services of a given city is usually either to decrease waste or increase revenue, generally the former. In an article elsewhere in this issue on the Wilmington, Delaware, water works, an interesting instance is cited where the meters had neither of these effects, but in spite of them the domestic consumption increased, and the revenue from rates decreased. Why this occurred is explained by the chief

engineer of the plant. The result was apparently due to insufficient forethought and care in fixing the meter rates, and especially the minimum rate and the amount of water furnished therefor. It appeared that the amount of water covered by the minimum rate was greater than that being used by the majority of consumers previous to the installation of meters, and there was therefore no inducement to cut down consumption or waste, but this followed its natural course of increasing year by year.

The lesson from this experience in Wilmington would appear to be not that meters are a useless expense, but that, before fixing meter rates, a study should be made of the local conditions respecting consumption, and inducement made to the consumers to eliminate waste; care, of course, being taken however not to place the minimum quantity so low as to discourage the use of sufficient water for all reasonable and sanitary purposes. It should be noted that the chief engineer of the plant in question, in spite of this experience, is still a firm believer in the desirability of selling water by meter measurement.

## WATER METERS IN WILMINGTON

### More Than Half of Supply Metered.—Importance of Meter Rates in Effecting Reduction of Waste.—“Readiness to Serve” Charge.

Of the average of about 11¼ million gallons a day supplied during the year of 1911-1912, by the water department of Wilmington, Delaware, 35 per cent was used for manufacturing purposes, all of which was supplied by meter measurement. The remaining 65 per cent is equivalent to 81.1 gallons per capita per day. Of this, 28 per cent was passed through meters, making the total amount measured by meter 53.2 per cent of the total consumption. (In the domestic consumption is apparently included all water used for public purposes, such as street sprinkling, sewer flushing, etc.) The meter rates allow 300 gallons per day for the minimum annual charge of \$10, and John A. Kienle, chief engineer of the department, as the result of an investigation on the subject of water rates, states that at least 50 per cent of the domestic consumers use less than one-half of this minimum quantity, and that 70 per cent use less than two-thirds of this amount, while only 10 per cent were subject to excess bills, and of these the majority indicated needless waste of water due principally to leaking fixtures. “In other words, the water rates now in effect and upon which our minimum charge is based, place a premium upon waste rather than upon economy. They also discriminate against the careful and economical users of water in that they essentially impose upon them a fine for practicing one of the best and most admirable qualities of citizenship, namely, the conservation of the city’s interests.”

“In order to determine rates that are fair according to service rendered, there must be a measure of that service. This means essentially a metered system. The installation of plant, mains, services and meters places a burden upon the department in the form of interest upon first cost of plant capacity to supply each service; maintenance of the service and meter; the reading of the same; the keeping of an account for each connection, and the collection of revenue.

“All of the above items are expenses that must be borne by the department whether there is any water used through the connection or not. These are fixed overhead charges which should be met proportionately by each consumer requiring a connection and water service. Carefully proportioned, these expenses would form an item

representing our readiness to serve each connection and is a charge that is fair and legitimately applicable, for the reason that we must assume that a property owner or manufacturer who requests such service intended to use the same when application for connection to the city’s mains was made, and a liability to such charge was therefore incurred.

“The other items affecting water rates are the water production and distribution expenses, extensions of the system, and sinking fund charges. All of these I have assumed should be provided for upon the basis of the quantity of water consumed.”

In some cities it has been found that the installation of meters has not resulted in any material decrease in consumption, and Mr. Kienle offers an explanation of why this was the case in Wilmington. In 1902 the department installed 1,157 meters, and approximately 5,800 were installed during the next ten years, practically all on domestic services; but notwithstanding this, the domestic per capita consumption increased in that time from 54.6 gallons to 73.1 gallons.

“Briefly,” said he, “the result has been that the primal object of metering the supply, namely, the reduction of our per capita consumption, has been nullified. The most discouraging feature, however, is that not only has this apparent waste of water added to our operating expenses in the items of production and extension, but has materially restricted the growth of our annual revenue”; the reason for this reduction being that the minimum rates are lower than the average revenue from flat rates on residences.

“This last statement taken at its face value would seem an argument against the installation of meters. However, the difficulty arises not from the meter installation, but solely from the rates applied after the meter is placed in service. There is no system of rates more inequitable or one that does more injustice to both consumer and department than the so-called schedule of fixture rates which in every instance must be assessed arbitrarily regardless of the quantity of water consumed. Almost innumerable are the arguments in favor of the use of meters, but the strongest, the one in fact which meets with popular approval, is the granting of a ‘square deal’ to every patron with whom we do business. I am convinced that this can only be secured by a measure of the service rendered and payment for the actual quantity consumed.

“I believe that it is the sentiment of your Board that the extravagant use of so-called free water should be placed under some restriction. In view of this feeling, I am of the opinion that the only way to accomplish the desired result will be to meter all public services and insist upon each branch of the city government paying for the service rendered upon the same basis as the private consumer. There should be no inequity in this proposition, since the revenue received by this department is deposited to the credit of the city council, and as each branch receives an annual appropriation from council, its budget can provide for the water consumption expense. The various uses of water can be compared with each other and with other similar services elsewhere. In this manner carelessness in its use can be avoided, and there should be developed the same interest as private consumers have in restricting the consumption to a reasonable limit.

“Once having established a fair service charge to meet the fixed or overhead expense of the department’s operation, the rate for water consumed can be established upon a basis to secure the desired economy in its use, and a proper revenue for all other expenses.”



## WATER WORKS STATISTICS OF AMERICAN CITIES.

TABLE NO. 1.—GENERAL AND FINANCIAL DATA. MUNICIPAL PLANTS.

Name of City	Population		Consumption, Gallons			Cost of Maintenance				Cost of plant to date	Out-standing bonds
	Total	Supplied	Total	Through meters	Maximum daily	Street work	Pump-ing Station	Purifi-cation Plant	Supt. office and all other		
<b>Arkansas:</b>											
Batesville .....	3,500	2,500	49,194,120	25,620,100	200,000	.....	.....	.....	.....	b	\$7,000
Fort Smith .....	33,000	4,045	800,000,000	c	2,500,000a	.....	.....	.....	\$30,000	.....	.....
<b>California:</b>											
San Diego .....	76,000	76,000	2,094,917,138	2,094,917,138	9,798,909	11,195	0	.....	374,687	\$2,500,000	1,370,209
<b>Colorado:</b>											
Alamosa .....	4,200	1,000a	40,158,896	0	208,000	296	1,790	.....	1,250	100,000	100,000
Colorado Spgs. ....	33,500	33,000	2,349,293,000	362,393,950	13,000,000	13,126	.....	.....	16,939	3,179,024	1,572,000
<b>Connecticut:</b>											
East Hartford .....	10,000	15,000	.....	400,000	1,500,000a	.....	.....	.....	22,000	.....	250,000
Hartford .....	126,592	3,127,943,500	.....	.....	10,130,000	98,501e	0	0	.....	4,126,423	475,000
Middletown .....	23,000	19,000	732,000,000	112,037,500	2,000,000	6,548	.....	.....	6,248	625,000	255,000
New Britain .....	50,000	49,000	1,390,000,000	1,390,000,000	4,000,000	2,500	.....	.....	116,000	2,600,000	1,175,000d
New London .....	19,659	19,000a	1,106,963,000a	382,891,300	.....	13,971e	0	0	.....	1,236,541	651,000
Norwich .....	28,000	20,000	647,000,000	250,000,000	2,000,000	8,000	0	0	10,450	1,090,292	215,000
Putnam .....	7,400	6,500	230,000,000	75,000,000a	700,000	.....	2,000a	400a	2,500	260,000	0
Southington .....	7,000	5,000	250,000,000	.....	750,000	1,109	.....	.....	3,039	261,625	222,000
So. Norwalk .....	13,000	13,000	799,493,000	.....	.....	7,000	0	4,368	40,206	589,320	315,000
Waterbury .....	80,000	70,000	.....	.....	.....	.....	.....	.....	.....	.....	1,485,000
Willimantic .....	11,260	11,260	344,205,840	.....	943,030	.....	.....	.....	.....	.....	175,000
Winsted .....	9,000	8,000a	547,500,000	150,500,000	1,500,000	.....	0	0	.....	.....	.....
<b>Delaware:</b>											
Dover .....	4,500	3,000	58,840,000	0	180,000	.....	.....	.....	6,000	45,000	8,000
Wilmington .....	90,000	90,100	4,111,702,241	2,187,754,500	12,400,000	37,164	26,979	6,715	24,159	3,025,000	1,000,000
<b>Florida:</b>											
Key West .....	25,000	f	25,174,299	0	.....	360	2,880	0	0	.....	100,000
Pensacola .....	37,000	16,000	511,000,000	186,000,000	1,500,000	2,296	1,500	.....	24,200	320,000	250,000
St. Augustine .....	6,000	g	200,400,000	800,000	850,000	.....	4,000	.....	.....	100,000	75,000
West Tampa .....	12,000	8,000	.....	.....	.....	2,000	.....	0	2,500	.....	.....
<b>Georgia:</b>											
Athens .....	20,000	.....	377,790,000	.....	1,100,000	.....	781	.....	25,461	213,650	144,000
Atlanta .....	175,000	.....	5,852,900,759	.....	.....	.....	.....	.....	.....	3,576,448	2,192,000
Bainbridge .....	4,500	4,200	15,330,000	67,800	.....	1,600	2,000	.....	3,000	.....	.....
Cuthbert .....	4,000	2,000	30,000,000	0	160,000	c	h	0	.....	80,000	50,000
Elberton .....	6,483	4,863	56,575,000	28,000,000	250,000	.....	.....	.....	.....	50,000	36,000
Rome .....	16,000	13,000	894,648,000	300,000,000	2,400,000	1,420	10,992	4,405	4,393	220,960	75,000
Thomasville .....	7,000	7,000	92,000,000a	c	275,000	14,730e	.....	.....	6,883	39,000	.....
<b>Illinois:</b>											
Bloomington ..	30,000	20,000a	720,000,000	1,500,000	3,673,000	2,000	12,000	.....	6,000	450,000	150,000
Canton .....	12,000	8,000	95,154,445	88,154,445	350,000	11,634e	.....	.....	.....	72,634	.....
Centralia .....	13,000	3,200	612,000,000	1,700,000	.....	2,974	2,354	0	17,111	200,000	80,000
Decatur .....	35,000	28,000	1,286,620,741	1,259,373,641	4,500,000	8,547	20,780	3,908	3,919	1,000,000	164,000
Harvard .....	3,500	.....	.....	.....	100,000	.....	.....	.....	400	.....	.....
Kewanee .....	16,000	4,000	100,000,000	60,531,000	350,000	.....	13,095	.....	1,400	160,000	18,000
Macomb .....	7,000	3,000	90,000,000a	70,000,000a	250,000	500	3,000	500	100	80,000	40,000
Oak Park .....	2,500	2,500	224,610,000	.....	1,669,000	.....	.....	.....	.....	.....	.....
Peru .....	9,000	6,000	1,460,000,000	.....	4,000,000	.....	3,000	0	6,000	100,000	12,000
Savanna .....	5,000	4,000a	200,000,000a	20,000,000	565,000	500	4,500	0	.....	75,000	25,000
White Hall .....	3,000	250	75,000,000	75,000,000	.....	.....	360	.....	700	40,000	10,000
<b>Indiana:</b>											
Bedford .....	10,000	4,000	292,000,000a	.....	800,000a	26,054e	.....	.....	.....	.....	40,000
Brazil .....	12,000	4,000	180,000,000	c	650,000	400	5,400	.....	1,400	.....	25,000
Clinton .....	10,000	7,500	11,000,000	c	300,000	c	4,380	.....	.....	75,850	29,500
Evansville .....	75,000	50,000a	3,415,915,400	.....	11,162,000	.....	.....	.....	.....	.....	400,000
Garrett .....	5,000	3,000	114,060,000	0	313,000	c	.....	.....	.....	75,000	9,000
Greenfield .....	5,000	4,000	300,000,000	100,000,000	1,000,000	875	2,000	0	200	160,000	6,000
Logansport .....	22,000	7,700	1,758,806,829	0	4,818,923	19,000e	.....	.....	.....	.....	.....
New Castle .....	12,000	11,000	432,000,000	2,500,000	1,250,000	.....	550	.....	200	55,000	.....
Tipton .....	5,000	4,500	67,280,000	32,360,000	250,000	.....	4,536	0	3,327	200,000	19,000
<b>Iowa:</b>											
Ames .....	4,300	4,300	47,450,000	28,000,000a	135,000	381	902	.....	2,730	70,604	50,000
Cedar Falls .....	6,500	6,000	173,130,300	42,323,000	604,000	6,628e	.....	.....	.....	116,475	43,000
Council Bluffs .....	30,000	22,000	1,000,000,000	750,000,000	4,500,000	2,768	36,000	1,900	7,500	725,365	600,000
Dubuque .....	38,500	20,000	894,129,770	.....	.....	.....	.....	.....	.....	.....	284,000
Fort Dodge .....	20,000	15,000	375,000,000	.....	1,000,000	500	6,000	0	.....	350,000	79,000
Mt. Pleasant .....	4,500	.....	c	20,714,000	83,000	159	156	0	2,334	30,000	2,000
Muscatine .....	16,000	12,000	430,000,000	96,386,300	2,000,000	.....	8,332	0	3,560	332,000	50,000
Newton .....	5,000	2,500	54,750,000	.....	.....	.....	.....	0	5,400	190,000	65,000
Sioux City .....	50,000	.....	971,000,000	971,000,000	2,660,509	40,587e	.....	.....	.....	794,895	0
<b>Kansas:</b>											
Cherryvale .....	5,000	3,000	138,000,000	31,200,000	459,400	2,000	3,900	900	1,000	200,000	155,000
El Dorado .....	31,000	2,000	70,000,000	.....	500,000	1,000	900	0	1,200	35,000	19,500
Fort Scott .....	15,000	14,000	400,000,000	250,000,000	1,600,000	3,000	3,200	2,000	2,400	162,920	122,000
Horton .....	4,500	700	18,000,000	18,000,000	65,000	890	.....	.....	.....	.....	18,000
Pittsburg .....	15,000	15,000	426,321,800	193,031,345	.....	21,000e	.....	.....	.....	265,000	245,000
Winfield .....	8,000	1,400	489,000,000	75,000,000	3,000,000	.....	6,083	1,074	1,610	194,759	154,000
<b>Kentucky:</b>											
Danville .....	5,420	4,320	313,476,000	282,550,000	1,050,000	0	417	46	12,710	120,000	47,000i
Fulton .....	6,000	4,500	100,000,000a	0	380,000a	.....	.....	.....	.....	30,000	25,000
Louisville .....	230,000	207,000	9,037,024,031	3,688,603,922	.....	42,024	51,266	31,182	121,052	8,900,000	1,500,000
<b>Louisiana:</b>											
New Iberia .....	10,000	3,000	200,000,000	.....	.....	1,450e	.....	.....	.....	100,000	18,000
New Orleans .....	350,000	240,000	6,072,000,000	4,307,000,000	24,000,000	70,000	66,000	60,000	69,000	8,700,000	5,800,000
<b>Maine:</b>											
Gardiner .....	7,000	5,500	275,000,000	.....	8,000,000	1,034	755	.....	19,280	259,189	219,500
Rumford .....	6,000	6,000	175,000,000a	.....	500,000a	1,146	4,559	.....	2,689	259,883	255,000
<b>Maryland:</b>											
Crisfield .....	5,000	800	15,000,000	8,000,000	.....	200	1,500	.....	800	.....	46,000

For footnotes, see page 820.



Table No. 1.—General and Financial Data. Municipal Plants. (Continued.)

Name of City	Population		Consumption, Gallons			Cost of Maintenance				Cost of plant to date	Out-standing bonds
	Total	Supplied	Total	Through meters	Maximum daily	Street work	Pump-ing Station	Purifi-cation Plant	Supt. office and all other		
Massachusetts:											
Adams	14,000	.....	504,000,000	.....	.....	.....	.....	.....	.....	351,228	.....
Andover	7,300	6,000	205,000,000	175,000,000a	582,000	.....	.....	.....	.....	586,607	275,000
Arlington	13,000	12,300	393,159,750	192,636,545	.....	7,188e	.....	.....	.....	630,425	100,937
Beverly	20,021	20,021	675,706,457	189,155,865	1,930,692	.....	.....	.....	.....	16,602,512	3,199,450
Boston	718,900	718,900	33,950,725,000	12,263,955,000	.....	637,517	.....	.....	.....	2,144,695	1,800,000
Brockton	73,200	71,500	1,077,165,663	747,571,682	5,902,990	.....	15,480	.....	43,785	6,602,472	2,871,000
Cambridge	110,000	110,000	3,827,528,600	.....	10,486,380	56,693	23,117	0	36,605	552,729	.....
Chelsea	36,743	36,743	1,074,376,000	748,888,800	.....	58,795e	.....	.....	.....	542,395	160,000
Chicopee	26,000	24,000	622,796,418	317,000,000	1,934,652	4,128	4,488	.....	50,510	477,006	174,500j
Concord	6,421	5,780	183,095,000	.....	741,000a	3,785	918	.....	11,905	418,818	196,500
Danvers	10,000	9,900	410,000,000	.....	1,300,000	.....	5,768	.....	.....	1,513,541	1,023,000
Gloucester	24,398p	23,672p	479,955,979	98,761,505	2,937,739	12,052	2,550	.....	.....	.....	116,000
Greenfield	11,500	10,500	.....	.....	1,600,000	21,086	2,541	.....	21,241	3,198,505	585,354k
Lowell	106,294	106,294	3,489,699,161	1,919,335,000	9,457,307	61,566	34,164	0	96,039	3,134,253	1,813,500
Lynn	103,015	103,015	2,470,637,112	1,110,700,700	9,444,354	184,867	25,573	.....	22,780	175,000	125,000
Maynard	6,300	5,800	119,860,992	.....	.....	200	2,245	.....	2,756	497,957	161,200
Natick	9,866	.....	198,102,208	94,990,277	.....	15,822	3,919	0	4,997	4,215,599	2,023,000
New Bedford	103,000	97,000	3,038,739,034	1,896,245,233	13,160,234	96,315e	.....	.....	1,200	592,515	190,350
North Adams	23,000	21,500	1,095,000,000	73,000,000	3,000,000	12,336	566	0	.....	845,991	112,000
Northampton	19,431	19,000a	289,470,921	136,471,680	.....	15,941e	0	0	.....	299,482	164,150
No. Attleboro	9,562	9,450	170,589,600	.....	.....	.....	48,230e	.....	.....	200,000	84,000
Orange	5,700	4,327	59,051,649	.....	165,875	5,270	2,173	0	997	1,383,000	692,000
Quincy	32,642	32,642	1,103,102,900	.....	.....	14,711e	0	0	.....	342,886	180,000
Reading	6,000	5,900	85,544,524	50,398,035	400,000	465	3,082	2,717	3,320	495,000	279,000
Revere	18,214	18,474	545,821,000	.....	.....	7,241	.....	.....	12,405	963,135	38,000
Somerville	80,000	80,000	2,352,465,000	.....	.....	27,119e	.....	.....	.....	4,948,915	2,383,000
Springfield	95,080	93,554	3,901,900,000	2,104,006,680	.....	130,473e	.....	.....	.....	1,451,920	837,500
Taunton	34,259	33,000	864,227,498	417,600,856	4,227,886	6,120	20,092	0	13,718	150,859	30,000
Turners Falls	7,000	6,000	209,601,344	.....	651,000	360	3,280	.....	3,890	803,691	375,000
Waltham	30,000	30,000	1,001,948,180	121,337,175	3,761,212	73,243e	.....	.....	.....	5,760,000	4,960,000
Worcester	160,123	158,923	4,057,322,880	2,839,209,945	14,331,680	103,253e	.....	.....	.....	.....	.....
Michigan:											
Alpena	12,706	12,456	818,888,300	.....	2,243,529	2,171	8,943	.....	2,232	278,661	200,000
Battle Creek	28,000	21,000	750,000,000	492,000,000	4,000,000a	2,328	12,581	0	10,013	558,743	30,000
Big Rapids	5,000	.....	730,000,000	.....	.....	.....	1,400	.....	480	75,000	63,000
Coldwater	6,500	4,500a	280,894,900	0	.....	.....	.....	.....	.....	136,181	0
Flint	40,000	.....	1,498,175,372	.....	.....	3,030	18,819	.....	27,950	601,542	662,500
Holland	11,030	8,916	290,783,048	159,506,500	2,116,304	1,400	9,730	0	2,231	207,856	62,300
Ishpeming	14,000	13,440	438,000,000	.....	1,200,000	.....	1,662	.....	10,300	187,000	22,500
Jackson	35,000	30,000	1,047,692,120	1,047,692,120	.....	18,000e	.....	.....	.....	687,873	.....
Kalamazoo	45,000	35,000a	712,186,679	450,000,000a	2,673,800	13,525e	.....	0	.....	1,150,000	138,000
Marquette	12,000	.....	806,575,000	187,760,500	.....	2,006	5,466	33	1,850	267,076	150,000
Marshall	30,000	24,000	1,291,026,228	.....	3,504,247	140	2,445	.....	1,295	63,229	49,000
Muskegon	30,000	24,000	1,291,026,228	.....	3,504,247	.....	.....	.....	.....	825,733	475,000
Niles	6,200	1,246	194,840,858	9,680,156	533,810	.....	450	.....	3,506	70,000	40,000
Owosso	10,000	6,000	198,409,925	52,187,137	.....	1,789	8,285	.....	2,209	195,000	95,000
Saginaw	55,000	27,250	3,594,214,330	.....	12,000,000	44,216e	.....	.....	.....	1,176,464	447,500
Ypsilanti	7,000	5,500a	181,913,410	110,000,000a	850,000	11,608e	.....	.....	.....	300,000	122,000
Minnesota:											
Albert Lea	8,000	5,000	131,759,240	92,000,000a	550,000	.....	5,000	.....	3,000	.....	.....
Bemidji	6,000	3,000	32,000,000	22,896,740	.....	824	1,798	.....	1,181	60,000	60,000
Chisholm	8,000	6,000	122,600,000	0	500,000	.....	.....	.....	.....	.....	.....
Cloquet	7,031	4,000	37,140,750	18,558,900	104,500	1,637	2,233	.....	994	125,000	65,000
Lake City	4,000	420	70,000,000	20,000,000	.....	200	4,000	.....	23,000	65,000	28,000
Minneapolis	319,000	290,000	8,555,460,805	.....	23,439,619	15,840	57,000	.....	8,846	6,991,711	1,930,000
Owatonna	7,000	5,500	142,026,572	.....	598,000	4,870e	.....	.....	.....	100,000	34,000
Pipeston	2,800	2,100	.....	.....	65,000	.....	2,845	597	720	.....	20,000
Mississippi:											
Gulfport	8,500	7,000a	.....	.....	.....	1,100	8,700	.....	1,000	132,000	125,000
Jackson	25,000	24,000	1,150,000,000	.....	3,800,000	38,000e	.....	0	.....	448,000	438,000
Meridian	26,000	21,000	918,650,000	422,579,000	3,131,500	.....	.....	.....	.....	525,000	400,000
Yazoo City	6,796	6,100	239,075,000	.....	810,000a	.....	.....	.....	.....	1	.....
Missouri:											
Brookfield	7,600	7,600	36,000,000	13,293,210	59,000	36	720	.....	1,740	60,000	20,000
Fulton	5,200	650	54,750,000	26,900,000	175,000	35	5,300	0	985	28,000	6,500
Higginsville	3,000	2,500	9,000,000	1,000,000	20,000	50	.....	.....	.....	.....	.....
Kansas City	270,000	260,000	12,001,485,574	709,786,928	38,347,356	190,505	234,281	30,961	101,493	9,704,533	3,784,000
Macon	4,000	2,800	96,000,000	.....	300,000	.....	.....	.....	.....	35,000	.....
Poplar Bluff	10,000	9,900	2,500,000a	.....	500,000	4,800	18,000	0	.....	125,000	12,000
St. Louis	750,000	749,000	29,966,500,000	9,000,000,000a	113,827,810	215,508	402,839	329,726	18,950	25,000,000	3,425,000
Trenton	6,000	4,000	220,000,000	100,000,000	.....	13,400e	.....	.....	.....	75,000	65,000
Montana:											
Helena	12,515	13,000	1,277,500,000	.....	3,500,000	11,750	2,700	0	5,336	439,814	386,000
Nebraska:											
Hastings	10,000	.....	239,383,530	.....	1,500,000	.....	.....	.....	.....	.....	10,000
Lincoln	52,000	43,000	1,112,090,000	611,649,500	3,066,000	2,236	14,208	0	46,943	904,890	127,300
New Hampshire:											
Claremont	7,535	5,000	.....	55,000,000a	.....	12,890e	.....	.....	.....	217,423	147,000
Concord	21,497	20,207	1,095,000,000	.....	3,000,000a	16,702	3,394	0	5,787	1,027,660	512,000
Dover	13,247	13,000	201,450,000	.....	475,000	14,665	5,649	562	.....	479,745	264,000
Keene	10,061	9,000	.....	.....	.....	2,035	.....	.....	1,000	380,988	60,000
Somersworth	6,000	4,500	161,982,039	.....	470,711	.....	.....	.....	.....	.....	152,000
New Jersey:											
Madison	5,000	5,000	137,755,000	.....	680,000	.....	5,300	0	.....	90,000	70,000
New Brunswick	30,000	30,000	1,364,748,395	373,635,000	3,728,821	1,502	3,761	1,373	13,349	730,576	.....
Perth Amboy	44,000	39,400	2,465,674,520	1,336,440,840	.....	6,175	27,458	.....	11,527	975,610	724,000
Rahway	10,000	7,000	735,795,396	370,000,000a	2,875,360	.....	11,564	6,159	5,319	.....	227,000
Salem	6,614	4,500	220,372,633	5,133,750	.....	7,654e	.....	.....	.....	100,000	0
Trenton	98,000	115,000	6,538,456,742	1,300,000,000	25,000,000	.....	89,760m	.....	16,093	3,317,673	945,500
New York:											
Binghamton	50,000	45,000	2,626,201,760	1,444,411,000	.....	16,332	17,453	14,994	23,352	1,000,000	0
Buffalo	450,000	450,000	51,086,651,620	12,762,367,000	184,100,100	127,671	235,154	.....	106,271	14,332,802	9,698,608

Table No. 1.—General and Financial Data. Municipal Plants. (Continued.)

Name of City	Population		Consumption, Gallons			Cost of Maintenance				Cost of plant to date	Out-standing bonds
	Total	Supplied	Total	Through meters	Maximum daily	Street work	Pump-ing Station	Purifi-cation Plant	Supt. office and all other		
New York (Continued):											
Gloversville	21,000	18,000			2,500,000	29,000e				512,121	50,000
Goshen	3,200	2,800	200,000,000a		400,000	500	0	0	0	77,000	30,000
Homer	2,600	1,500	54,750,000	800,000	150,000	50	800		1,200	31,000	0
Hudson	12,500	12,150	730,000,000	100,000,000	2,500,000	500	0	0	2,000	275,000	
Jamestown	31,300	36,000	1,155,921,200	866,941,000	4,500,000	6,286	18,386	0	10,943	955,329	465,000
Johnson	10,447	10,340	816,505,000	60,553,945	2,237,000	4,477	0		9,319	205,500	98,000
Kingston	27,000	25,000	2,560,103,750				0	0		872,705	726,000
Little Falls	12,237	12,000	1,200,000,000a		3,500,000	5,006			3,919	516,000	325,000
Malone	7,000	7,000	365,000,000	0	1,000,000				2,500	480,000	212,000
Mechanicsville	7,000	5,000			1,000,000				1,200	175,000	
Newark	7,000	5,500	122,500,000		500,000					93,239	48,000
No. Tonawanda	13,000		1,948,753,020			4,074	10,216	0	1,610	500,000	400,000
Ogdensburg	18,000	16,000	900,000,000a		3,200,000	2,000	5,000	5,000	3,000	400,000	230,000
Ossining	11,000		196,787,110		539,142	4,076	7,677		3,102	319,701	195,000
Peekskill	16,000	13,000	1,127,698,970		3,500,000	503	12,643	4,153	18,686	600,000	468,136
Salamanca	6,000	5,600	438,000,000	18,295,318	1,200,000	1,390	3,026		1,742	110,090	74,000
Saranac Lake	5,000	5,200	365,000,000	0	1,000,000	840	600	0	0	45,000	175,000
Schenectady	80,000	80,000	3,956,250,000	400,000,000a	14,650,000	c	c	0	c	2,000,000	689,000
Solvay	6,000	6,000	126,140,580	90,000,000	600,000	2,000	1,600		10,000	80,000	75,000
Syracuse	150,000	145,000				50,900e			90,000	6,000,000	4,845,000
Troy	75,000	75,000	7,300,000,000	734,590,231	21,000,000					4,000,000	2,774,597
White Plains	18,000	20,000	500,000,000	300,000,000	1,600,000	9,700	32,000		5,200	900,000	860,000
Yonkers	90,000	85,000	3,082,873,418	1,807,754,692	8,446,228					3,062,188	2,368,000
North Carolina:											
Gastonia	10,000		80,436,750		350,000	7,245e				75,156	68,000
Kinston	9,000	4,000	29,200,000	25,000,000	80,000	1,500	350		600	65,000	50,000
Lenoir	4,000	1,000			300,000		0	0		80,000	80,000
Mooresville	3,500		5,000,000	3,000,000	15,000	0	275	0	0	15,500	15,000
Rocky Mount	10,000	8,000	c	c	500,000					139,770	84,500
Wilmington	35,000	26,000	626,701,000		1,975,500	1,559	16,285	7,516	4,722	388,825	385,000
North Dakota:											
Fargo	18,000	14,000	900,000,000	10,000,000	4,000,000	6,000				215,000	125,000
Grand Forks	13,000	13,000	321,921,000	145,000,000	1,500,000	500	12,034	2,775		372,000	
Williston	5,500		90,000,000	10,000,000	500,000		3,240	0	1,100	72,000	63,000
Ohio:											
Bellaire	12,956	10,000	1,460,000,000	220,797,000	4,000,000	3,232	12,531		1,223	600,000	205,000
Cincinnati	392,070	402,572	18,802,466,760	7,583,968,433	67,672,649	168,807	197,940	72,271	76,516		12,788,500
Cleveland	660,000	648,000	26,748,978,462	20,341,875,000	90,700,000	192,846	157,262	4,828	71,459	17,135,850	6,481,743
Coshocton	10,500	10,000	511,000,000	85,000,000	1,600,000	1,503	7,609	0	36,723	185,000	40,500
Delphos	6,000		164,250,000		9,000e					82,000	
Elyria	14,825	13,000	645,275,708	354,901,639	2,360,600	3,177	573	623	44,174	149,065	588,000
Lancaster	15,000	10,500	365,000,000		1,250,000	1,084	1,653		1,163	154,336	22,000
Mansfield	25,000	20,000	738,000,000	368,000,000	2,500,000	5,022	16,800	0	2,800	200,000	43,000
Middletown	16,000		917,500,000		4,000,000	4,200	1,123	0	2,668		120,000
Mt. Vernon	10,000	7,500	480,500,000		1,966,000	3,024	6,400	0	2,011	125,000	24,000
Napoleon	5,000	3,000	131,100,451			1,313	4,973	0	1,268	60,000	53,000
Nelsonville	6,082	6,000	180,000,000a	0	500,000			0		41,500	41,500
Springfield	50,000	40,000	2,334,939,794	466,800,000	8,000,000	7,122	14,552	0	8,160	1,351,414	485,000
Wapakoneta	5,300		92,838,000	65,000,000	400,000	n				75,000	28,000
Youngstown	100,000	87,000	3,578,000,000	1,100,000,000	12,000,000						
Oklahoma:											
Enid	13,500	9,000a		all	97,600	5,329	6,676	0	15,500	221,709	245,000
Guthrie	12,000	6,000	184,761,000	56,570,000	600,000	1,929	8,305	1,513	2,723	170,000	134,000
Oklahoma City	72,000	54,000	1,372,500,000		6,500,000					1,315,441	1,210,000
Okmulgee	8,000	4,250	146,000,000	109,500,000			7,033m			198,000	173,000
Ponca City	5,000	4,500	100,000,000	100,000,000	600,000	125	2,000	0	600	60,000	57,500
Oregon:											
Oregon City	6,500				1,000,000				5,000	150,000	50,000
Pennsylvania:											
Bradford	17,000	16,500	730,000,000		2,000,000		2,977	0		567,981	70,000
Chambersburg	12,000	12,000	c	236,898,000		156			3,345	328,000	150,000
Grove City	42,000	4,000			90,000		1,200	0	960	45,000	35,000
Homestead	23,000	23,000	750,000,000	5,000,000	3,000,000	628	14,414	0	10,471	150,000	94,000
Lancaster	50,000	45,000	2,570,490,000	768,540,000	7,500,000	29,418	28,651	39,565	1,300	1,500,000	120,000
Lebanon	19,240	19,240	730,000,000	90,000,000	2,250,000	200	1,200	0	2,100	678,000	168,200
McKeesport	42,700	42,500	1,335,000,000		3,000,000	19,743	31,327	26,580	6,715	973,901	253,812
North East	3,000	2,800	160,000,000	60,000,000a	500,000a				1,360	65,000	3,000
Oil City	18,000	18,200	912,500,000	912,000,000	2,500,000	13,723	12,630	0	8,972	475,101	0
Reading	101,030	100,930	5,227,195,654	1,708,935,955	19,170,050	7,911	16,737	8,750	21,730	4,098,184	708,000
Shenandoah	27,000	18,000	639,000,000	32,000,000	1,750,000	3,000	25,135	0	6,815		111,200
Steelton	15,000	16,000	596,988,300		1,636,900					500,000	
Titusville	9,000	9,000	730,000,000	36,000,000a	2,000,000	11,000e		0		237,811	0
Rhode Island:											
Pawtucket	55,000	90,000	2,416,929,891		9,300,000	8,466	7,083	0	5,005	2,664,305	1,442,000
South Carolina:											
Abbeville	5,575	2,920	50,500,000a	21,250,000	c	c	n	n	n	49,539	25,000
Florence	10,000	4,500	91,250,000a		375,000	16,796e				97,188	80,000
Orangeburg	6,500	4,500a	75,000,000a	25,000,000a	325,000	300	n	n	n	40,000	40,000
Rock Hill	7,300		73,000,000	5,000,000	200,000		n	0	n	n	n
Union	5,620	4,000	72,000,000	72,000,000	300,000	215	180	75	5,509	64,000	40,000
South Dakota:											
Aberdeen	13,500	80,000	365,000,000a	0		5,192			7,192		
Mitchell	8,000	3,800	92,563,000	58,733,000	350,000	3,024	6,275	0	107	65,000	40,000
Rapid City	4,500	4,500	c	53,293,000	c	300	0	0	2,500	150,000	98,000
Tennessee:											
Clarksville	10,000	8,000	29,000,000		1,200,000	12,000e				160,000	160,000
Dyersburg	6,000	6,000	180,000,000	10,000,000	500,000	n	n	n	n	n	n
Texas:											
Denton	7,400	7,000	105,000,000	12,000,000	550,000		12,438	0		212,000	
Longview	8,000	4,000			250,000		400	0			40,000
Sherman	18,000	17,500	292,000,000	180,000,000a	900,000						
Waxahachie	7,500	5,000	91,250,000	91,250,000	250,000	15,423e		0		66,003	54,400
Utah:											
Logan	7,500	5,000					0	0	2,225	150,000	40,000
Ogden	30,000					15,748e				835,393	525,000
Salt Lake City	94,000	90,000	8,030,000,000	1,403,377,550	22,000,000	127,514e		0		6,250,000	1,575,000



Table No. 1.—General and Financial Data. Municipal Plants. (Continued.)

Name of City	Population		Consumption, Gallons			Cost of Maintenance				Cost of plant to date	Out-standing bonds
	Total	Supplied	Total	Through meters	Maximum daily	Street work	Pump-ing Station	Purifi-cation Plant	Supt., office and all other		
<b>Vermont:</b>											
Burlington .....	21,200	20,500	414,310,640	274,905,164	.....	28,887e	8,354	5,535	.....	.....	239,000
Rutland .....	15,000	14,000	1,100,000,000a	184,042,662	3,000,000	22,855e	.....	.....	.....	.....	147,000
<b>Virginia:</b>											
Clifton Forge ...	6,000	5,900	551,660,000a	24,000,000a	1,600,000	500	0	0	2,100	190,000	190,000
Harrisonburg ...	5,000	5,000	300,000,000	36,000,000	900,000..	432	0	0	350	100,000	50,000
Marion .....	3,000	3,000	.....	.....	.....	150	0	0	500	25,000	12,000
Winchester .....	7,000	7,000	316,000,000a	65,000,000a	1,100,000a	5,000	3,800	0	2,000	140,000	25,000
<b>Washington:</b>											
Port Townsend..	4,250	5,500	c	153,693,075	.....	1,020	0	0	5,053	279,722	185,000
Seattle .....	280,000	270,000	10,000,000,000a	6,550,294,522	38,000,000a	38,134	16,761	0	69,527	12,682,046	5,584,807
Spokane .....	110,000	110,000	11,722,737,880	1,800,000,000a	50,997,050	332,450	71,669	0	54,039	4,807,711	2,720,000
Walla Walla ....	20,000	.....	.....	.....	.....	1,896	.....	.....	5,883	544,507	.....
<b>West Virginia:</b>											
Keyser .....	5,500	5,500	.....	.....	.....	.....	0	0	.....	70,000	.....
Parkersburg ....	20,000	20,000	1,095,000,000	1,500,000	3,000,000	1,500	2,500	0	7,940	485,000	370,000
<b>Wisconsin:</b>											
Baraboo .....	6,230	4,600	220,000,000	110,000,000a	600,000	.....	3,600	.....	420	125,000	89,000
Eau Claire .....	19,000	15,000	730,000,000	.....	4,500,000	.....	.....	.....	12,381	327,790	100,000
Grand Rapids ...	6,521	3,260	114,873,297	223,063,200	.....	.....	181	0	2,282	145,083	75,000
La Crosse .....	30,417	25,000	1,008,691,100	223,063,200	6,214,000	23,093e	.....	0	.....	525,000	517,000
Madison .....	30,000	.....	714,937,100	412,616,446	.....	4,870	22,972	0	6,282	716,437	122,500
Milwaukee .....	400,000	420,000	17,405,609,580	11,437,219,100	62,908,770	73,951	116,177	2,839	79,194	7,353,206	20,000
Monroe .....	4,500	3,000	84,000,000	66,000,000	357,000	.....	5,062	0	1,438	101,000	78,000
Oconomowoc ....	3,451	381	45,061,564	25,061,564	123,457	1,449	29	0	115	73,259	41,000
Watertown .....	10,000	6,500	290,859,100	178,397,315	1,066,090	.....	.....	.....	.....	174,379	66,000
Waupaca .....	2,800	2,000	110,096,000	830,880	681,000	358	1,219	0	661	71,899	44,600
Wausau .....	18,000	12,000	800,000,000	30,000,000	2,500,000	1,700	625	0	1,125	358,500	137,000
West Allis .....	8,000	6,000	105,000,000	85,753,000	285,000	300	2,000	0	1,800	c	50,000
<b>Wyoming:</b>											
Cheyenne .....	12,000	15,000	1,332,000,000	.....	4,820,000	7,287	2,720	0	2,988	1,350,000	935,500
<b>Canada:</b>											
Brantford, Ont..	26,370	24,150	1,168,455,166	340,470,000	3,871,098	4,732	12,656	0	5,641	547,882	470,733
Calgary, Alta. ...	75,000	75,000	.....	.....	.....	8,000	28,290	0	30,324	2,932,000	2,314,000
Kingston, Ont. ...	19,716	19,400	909,286,263	88,100,936	3,111,000	1,963	6,821	87	17,615	318,306	182,000
Lethbridge, Alta. 12,000	12,000	12,000	419,978,000	186,155,316	2,023,000	3,076	15,000	0	3,500	386,000	27,154
London, Ont. ....	46,300	46,200	1,441,938,000	c	.....	10,384	26,234	0	19,193	1,135,573	862,275
St.Catherines,Ont. 16,000	16,000	16,000	1,022,000,000a	332,880,000a	3,250,000a	1,975	.....	0	6,859	742,009	525,000
Toronto, Ont. ....	450,000	450,000	18,613,660,792	3,465,232,123	.....	118,277	349,325	60,627	.....	11,200,000	7,584,000
Winnipeg, Man. 200,000a	.....	.....	2,858,193,032	.....	9,144,560	.....	.....	.....	.....	4,664,000	.....

a—Approximate. b—Water and light plant together cost \$65,000. c—Not known. d—Sinking fund of \$93,715. e—Includes all maintenance cost. f—Supply used for street and sewer flushing and fire purposes only. g—1,000 connections. h—Water and light together cost \$6,500. i—\$20,000 in sinking fund. j—Sinking fund of \$18,107. k—After deducting sinking fund. l—Construction and maintenance costs of water, light and sewer systems combined. m—Includes purification plants. n—Water and light expenses combined. o—About 75 artesian wells. p—36,000, of which 35,672 are supplied.

TABLE NO. 2.—GENERAL AND FINANCIAL DATA. PRIVATELY OWNED PLANTS.

Name of City.	Population.		Consumption, Gallons.			Cost of Maintenance.				Cost of plant to date.	Out-standing bonds.
	Total.	Supplied.	Total.	Through meters.	Maximum daily.	Street work.	Pump-ing station.	Purifi-cation plant.	Sup't., office and all other.		
<b>Alabama:</b>											
Bessemer .....	15,000	5,000	365,000,000	.....	1,000,000	....	....	....	.....	\$300,000	.....
Florence .....	10,000	.....	.....	.....	1,000,000	....	....	....	.....	.....	\$125,000
<b>Arkansas:</b>											
Helena .....	16,750	15,000	500,000,000	200,000,000	2,500,000	....	....	....	.....	.....	.....
<b>California:</b>											
Pomona .....	11,000	9,000	b	b	b	....	....	....	.....	433,000	175,000
Riverside .....	16,000	12,000	b	b	.....	....	....	....	.....	531,737	597,500
<b>Connecticut:</b>											
Bristol .....	14,274	11,000a	370,000,000	240,000,000	1,250,000	\$700	....	....	\$28,000	508,000	100,000
Naugatuck .....	12,000	10,000	.....	.....	.....	.....	....	.....	.....	375,000	.....
Torrington .....	18,000	12,500	650,000,000	.....	3,500,000	2,680	0	\$2,370	20,490	395,000	0
<b>Illinois:</b>											
Kankakee .....	18,000	18,000	736,000,000	736,000,000	.....	....	....	....	.....	.....	.....
Peoria .....	72,000	42,000	3,066,000,000	766,500,000	10,664,500	.....	.....	.....	.....	.....	.....
Quincy .....	37,000	27,000a	729,000,000	490,000,000	2,750,000	1,268	1,317	658	104,779	841,369	550,000
Streator .....	15,700	13,000	685,000,000	232,200,000	2,240,000	617	10,557b	....	4,730	597,000	250,000
<b>Indiana:</b>											
Linton .....	8,000	5,000a	165,000,000a	47,329,000	600,000	585c	....	....	.....	129,346	65,000
Richmond .....	25,000	22,000	978,740,000	472,511,522	3,500,000a	.....	.....	.....	.....	707,000	250,000
Terre Haute .....	58,157	35,000a	1,528,686,990	718,557,456	7,500,000	.....	.....	.....	.....	.....	1,135,000
Valparaiso .....	8,500	7,600a	317,964,200	.....	1,160,100	917	1,104	845	13,171	160,000	51,000
Vincennes .....	15,000	300	b	b	2,000,000a	.....	.....	.....	.....	.....	.....
<b>Iowa</b>											
Des Moines.....	92,500	.....	1,972,000,000	1,114,000,000	7,000,000	....	....	....	.....	.....	.....
Iowa City.....	10,350	7,500	649,317,144	86,142,000	2,270,240	54	15,576	1,029	10,779	.....	90,000
<b>Kansas:</b>											
Atchison .....	16,000	11,000	485,000,000	210,000,000	2,050,000	1,089	12,027	1,828	11,229	398,178	160,000
Leavenworth .....	22,000	1,700	.....	.....	.....	....	....	....	.....	400,000a	.....
<b>Kentucky:</b>											
Frankfort .....	12,000	.....	730,000,000	.....	.....	....	....	....	.....	350,000	150,000
Lexington .....	37,500	42,500	826,642,987	826,642,987	2,750,000	....	....	....	.....	.....	.....
Maysville .....	8,000	6,500	275,000,000a	70,000,000	700,000	400	b	500	b	b	0
Paris .....	8,000	6,000	8,000,000	1,000,000	900,000	....	4,800	300	1,500	200,000	78,000
<b>Maine:</b>											
Biddeford .....	26,000d	26,000d	642,340,988	165,244,778	.....	345	2,096	....	1,723	128,200	7,800
Skowhegan .....	6,000	3,000	.....	.....	.....	.....	.....	.....	.....	.....	.....

For footnotes, see page 821.

Table No. 2.—General and Financial Data. Privately Owned Plants. (Continued.)

Name of City.	Population.		Consumption, Gallons.			Cost of Maintenance.				Cost of plant to date.	Out-standing bonds.
	Total.	Supplied.	Total.	Through meters.	Maximum daily.	Street work.	Pump-ing station.	Purifi-cation plant.	Sup't. office and all other.		
<b>Maryland:</b>											
Hagerstown .....	22,500	20,000a	900,000,000	200,000,000	3,000,000	3,532	1,372	....	12,757	832,719	345,000
<b>Michigan:</b>											
Escanaba .....	13,200	8,000	705,000,000	128,165,000	3,611,500	....	7,159	1,339	8,401	325,000	100,000
Menominee .....	10,500	7,000	360,000,000	120,000,000	.....	....	....	....	....	....	....
<b>Minnesota:</b>											
Crookston .....	8,000	6,000	150,000,000a	.....	450,000a	....	8,000	10,000	.....	200,000	180
Rochester .....	10,000	7,000	200,000,000	140,000,000	750,000	800	....	....	2,000	....	....
<b>Missouri:</b>											
Chillicothe .....	8,000	4,000	.....	.....	.....	....	....	....	....	....	....
<b>Montana:</b>											
Anaconda .....	10,000	10,000	1,080,000,000	0	5,000,000	....	....	....	....	....	....
Livingston .....	6,000	5,500	.....	.....	3,000,000	....	....	....	....	....	0
<b>New Jersey:</b>											
Montclair .....	24,000	24,000	560,000,000	.....	.....	....	....	....	....	255,000	100,000
West Orange .....	10,980	10,700	248,443,912	155,962,375	.....	....	....	....	....	....	....
<b>New York:</b>											
Elmira .....	45,000	35,000	2,225,200,000	f	8,000,000	....	....	....	....	....	....
Mt. Vernon .....	35,000	35,000	1,096,763,915	.....	3,500,000	....	....	....	....	....	....
New Rochelle .....	39,000	38,500	.....	.....	.....	....	....	....	....	....	....
Norwich .....	7,400	7,000	.....	.....	.....	....	....	....	....	348,433	176,500
<b>North Carolina:</b>											
Durham .....	28,000a	.....	34,000,000a	.....	.....	....	....	....	....	....	250,000
Raleigh .....	23,000	15,000	517,696,763	227,441,600	1,871,000	....	....	....	....	....	....
<b>Ohio:</b>											
Delaware .....	10,000	9,000	333,071,000	175,000,000	1,200,000	1,253	3,444	0	5,462	245,000	187,000
<b>Pennsylvania:</b>											
Chester .....	70,000	65,000	1,378,000,000	682,000,000	5,260,000	1,290	12,051	4,860	30,200	3,094,488	1,800,000
Hanover .....	12,000	10,000	350,000,000	150,000,000	1,250,000	....	....	....	....	....	....
Indiana .....	7,000	5,000	172,375,000	90,000,000	475,000	1,200	1,200	300	5,000	....	80,000
Pittsburgh g.....	.....	85,000	3,069,342,000	3,000,000,000	.....	....	....	....	....	....	....
Plymouth .....	17,000	26,000	1,095,000,000	400,000,000	3,200,000	....	....	....	....	....	....
<b>Texas:</b>											
Comanche .....	4,500	2,000	7,470,000	.....	.....	5,925	2,100	....	1,000	....	....
Laredo .....	16,000	15,000	438,000,000	52,920,000	1,620,000	5,135	4,224	481	33,103	232,719	143,800
Palestine .....	11,000	1,200	.....	.....	750,000	....	17,500	....	17,500	300,600	90,000
<b>Wisconsin:</b>											
Ashland .....	12,000	11,000	432,413,480	145,606,500	1,871,060	2,364	12,799h	....	8,650	676,116	223,000
Green Bay .....	27,000	23,500	530,624,798	.....	2,194,800	4,975	16,988	0	9,590	819,602	400,000

a—Approximate. b—Not known. c—All maintenance work. d—Summer population, 40,000. e—Water purchased from Mountain Water Company. f—All through Venturi meter at plant. g—Supplies part of Pittsburgh, also Wilkesburg, Edgewood, Swissvale, North Braddock, Rankin, East Pittsburgh, Turtle Creek, Wilmerding, Pitcairn, Trafford, Braddock, Paton, North Versailles. h—Includes purification plant also. i—Will be taken over by city about June 15th.

TABLE NO. 3.—DISTRIBUTION SYSTEM DATA. MUNICIPAL PLANTS.

Name of City.	Street		Mains Discon- tinued during year length, feet	Now in service, length, miles	Hy- drants, now in service	Appliances for filling watering carts	Stop gates	Service connections		Meters		Motors and elevators supplied	Private fire con- nections
	Laid during year Length, feet	Kinds						Added during year	Now in service	Added during year	Now in service		
<b>Arkansas:</b>													
Batesville .....	0	....	0	4.1	30	2	12	32	530	36	396	0	3
Fort Smith .....	0	....	....	68.0	330	....	....	100a	....	50	1,000	....	15
<b>California:</b>													
San Bernardino.....	28,196	c.i., wl. & steel	....	....	281	....	....	....	2,492	....	....	....	....
Vallejo .....	....	....	....	40.0a	150	....	....	....	....	....	....	....	....
<b>Colorado:</b>													
Anamosa .....	0	0	0	11.75	97	0	46	104	110	0	0	0	2
Colorado Springs .....	5,291	c.i.	2,170	142.8	504	0	1,880	198	11,858	22	213	7	....
<b>Connecticut:</b>													
East Hartford .....	10,000a	....	0	28.0	225	3	125	200	1,500	6	20	0	5
Hartford .....	76,545	c.i.	12,504	180.0	1,367	0	2,871	657	13,287	658	13,105	....	96
Middletown .....	800	....	....	38.0	220	0	338	64	2,400	0	88	2	8
New Britain .....	10,951	c.i.	0	87.9	608	95	1,143	135	4,722	1,521	4,651	22	79
New London .....	6,268	....	0	67.5	390	47	585	70	4,197	23	825	12	27
Norwich .....	7,000	c.i.	0	60.0	472	0	....	51	3,752	107	772	9	40
Putnam .....	500	c.i.	200	18.0	93	3	158	10	1,000	0	97	2	9
Southington .....	10,681	c.i. & wl.	....	....	119	7	300	80	976	41	69	5	3
South Norwalk .....	4,189	c.i.	....	46.0	248	5	....	88	2,375	20	120	2	8
Waterbury .....	9,845	c.i. & wl.	21	87.9	614	78	797	210	6,859	48	1,548	....	....
Willimantic .....	5,355	c.i.	0	....	212	0	142	50	1,430	61	1,165	4	14
Winsted .....	1,499	c.i.	....	23.5	243	....	308	18	1,194	9	122	16	....b
<b>Delaware:</b>													
Dover .....	0	....	0	8.0	48	2	36	14	674	0	0	3	5
Wilmington .....	7,783	c.i.	..	133.6	935	....	....	427	19,331	644	7,574	....	....
<b>Florida:</b>													
Key West .....	10,400	....	0	8.1	110	0	58	3	67	0	0	5	2
Pensacola .....	26,000	....	0	37.0	277	0	180	150	3,200	262	2,600	4	6
St. Augustine .....	1,200	c.i.	0	....	136	0	15	55	950	60	300	3	15
West Tampa .....	5,000a	....	0	14.0	100	0	75	95	1,000	18	96	....	....
<b>Georgia:</b>													
Athens .....	1,800	....	0	19.5	248	0	....	115	1,440	115	1,440	8	23
Atlanta .....	171,991	c.i.	3,814	313.5	2,929	....	4,190	2,111	25,465	2,116	24,670	....	148
Bainbridge .....	800	c.i.	0	5.0	72	0	12	150	960	25	150	0	6
Cuthbert .....	0	....	0	9.0	54	0	18	30	265	0	0	4	2
Elberton .....	0	....	0	6.9	58	1	21	6	500	....	206	4	2
Rome .....	22,628	....	0	25.7	260	0	....	500a	3,000	250a	1,000a	20	15
Thomasville .....	0	....	0	....	99	0	25	34	689	34	689	4	3

For footnotes, see page 824.



Table No. 3.—Distribution System Data. Municipal Plants. (Continued.)

Name of City.	Street Mains		Discontinued during year length, feet	Now in service, length, miles	Hydrants now in service	Appliances for filling water carts		Service connections		Meters		Motors and elevators supplied	Private fire connections
	Laid during year length, feet	Kinds				Stop gates	Added during year	Now in service	Added during year	Now in service			
Illinois:													
Bloomington	5,000	....	0	51.9	637	12	349	178	4,753	196	426	.....	6
Canton	2,767	....	0	22.3	188	0	350a	50	1,750a	85	1,750a	4	0
Centralia	0	....	0	17.5	108	2	....	53	893	53	893	0	0
Decatur	17,250	c.i.	0	61.1	614	3	740	334	5,528	364	5,519	5	15
Harvard	8,000	....	....	....	80	0	40	40	530	40	530	....	1
Kewanee	2,293	c.i.	0	18.5	218	1	162	35	950	40	1,017	c	5
Macomb	1,200	c.i.	0	12.0	120	1	30	40	612	40	600	3	3
Oak Park	6,099	....	....	78.0	790	....	443	697	5,000	256	1,098	....	....
Peru	10,000a	c.i.	0	18.0	98	4	40	100	2,000	150	2,000	0	5
Savanna	5,000a	c.i.	0	3.0a	77	6	48a	25	1,100	15	20	0	0
White Hall	36,000a	....	....	20.0	75	....	20	24	250	....	250	....	....
Indiana:													
Bedford	0	....	0	17.0	121	0	56	53	1,053	0	9	0	2
Brazil	0	....	0	10.6	136	2	75	50	850	50	820	c	3
Clinton	2,400	....	0	13.0	92	1	40	c	900	5	50	0	2
Evansville	34,373	c.i.	0	110.7	734	....	1,330	1,563	10,401	4	43	....	....
Garrett	306	....	0	11.0	53	1	38	100	825	0	0	0	0
Greenfield	0	....	0	8.0	87	4	50	25	1,300	100	600	0	3
Logansport	10,000a	....	0	42.0	217	2	300	170	3,899	0	1	3	3
New Castle	8,250	....	0	8.4	25	2	264	96	2,780	7	151	1	3
Tipton	1,400	....	0	15.0a	86	1	1	48	964	100	640	1	2
Iowa:													
Ames	3,273	....	0	11.7	75	2	100	....	625	105	621	0	0
Cedar Falls	4,304	c.i.	....	18.3	116	....	141	90	1,220	62	723	....f	8
Council Bluffs	64,700	....	0	57.2	364	....	....	115	5,500	416	2,800	....f	27
Dubuque	5,501	....	0	54.9	423	10	....	156	3,481	268	3,617	2	24
Fort Dodge	10,000	c.i.	0	27.0	178	2	300	250	1,879	250	1,879	2	15
Mt. Pleasant	0	....	0	10.0	76	0	38	41	403	41	385	0	2
Muscatine	6,299	c.i.	0	34.0	358	....	367	160	2,336	50	215	0	6
Newton	10,600	....	....	21.0	90	2	25	200	900	200	900	....	2
Sioux City	57,984	c.i. & gal.	....	103.0	476	6	669	601	6,221	523	6,221	....	18
Kansas:													
Cherryvale	1,200	....	0	25.0	108	3	600	50	650	5	25	6	10
El Dorado	2,000	w.i.	0	14.0a	71	2	61	33	462	32	435	0	3
Fort Smith	10,500	....	0	32.0	200	6	200	60	1,990	55	1,200	12	6
Horton	0	0	0	5.3	52	0	0	20	160	20	160	0	0
Pittsburg	33,729	....	14,704	40.1	256	3	406	121	3,817	0	962	0	0
Winfield	....	....	....	27.0	190	....	....	....	....	0	135	0	0
Kentucky:													
Danville	0	....	0	12.3	114	0	53	42	755	42	755	1	0
Fulton	4,500	....	....	3.8a	923	0	8	....	....	28	28	0	0
Louisville	41,907	c.i.	1,060	371.4	1,306d	200	5,663	2,030	38,340	222	3,022	f	150
Louisiana:													
New Iberia	300	....	....	....	90	100	15	20	400	1	3	1	3
New Orleans	65,578	....	3,221	529.4	5,103	0	4,942	5,000	34,000e	5,000	34,000	....f	230
Maine:													
Auburn	4,585	....	....	32.3	128	....	531	48	....	....	45	....	....
Augusta	3,763	c.i. & gal.	591	44.7	169	....	275	73	2,023	4	23	7	....
Bangor	5,752	....	....	52.5	300	....	496	122	5,012	....	113	....	....
Gardiner	1,970	c.i.	0	18.0	78	3	....	18	1,300	0	8	0	6
Rumford	1,287	....	0	17.0	51	1	67	18	....	2	....	1	5
Maryland:													
Crisfield	0	0	0	2.0a	140	....	6	20	120	20	118	....	....
Massachusetts:													
Adams	....	....	....	....	....	....	....	....	3,200	0	75	13	....
Andover	13,990	....	0	47.0	344	10	c	61	1,302	58	1,100	3	30
Arlington	46,233	c.i.	0	42.8	430	27	380	172	2,366	421	1,957	4	2
Beverly	24,869	c.i. & gal.	14,346	79.7	469	62	772	150	4,405	348	726	....	6
Boston	83,443	....	29,518	828.6	8,613	543	11,356	1,592	102,506	7,422	34,565	697	....
Brockton	19,724	c.i.	0	118.4	1,082	53	1,724	269	8,695	259	8,666	13	0
Cambridge	31,148	c.i.	6,284	136.1	1,125	73	....	289	16,194	347	5,045	f	155
Chelsea	2,540	c.i.	....	42.6	312	33	473	57	4,682	322	4,574	2	25
Chicopee	10,245	....	....	61.0	302	24	....	86	2,720	124	1,200	1	1
Clinton	1,285	....	....	36.8	285	....	....	....	....	11	1,601	....	....
Concord	9,872	c.i. & gal.	6,659	44.7	224	2	271	38	1,214	....	30	3	4
Danvers	3,872	c.i.	....	58.6	289	13	484	80	2,265	....	40	....	....
Fitchburg	4,975	....	0	80.9	724	....	805	109	5,448	415	4,416	121	....
Gloucester	21,835	c.i., gal. & conc. ind.	67	73.6	329	48	582	108	4,771	53	399	....	13
Greenfield	4,650	c.i. & w.i.	0	45.4	285	7	417	113	2,257	20	206	15	6
Lowell	15,745	....	7,210	150.4	1,283	25	1,737	233	12,952	356	10,571	3	125
Lynn	4,616	c.i.	0	150.5	1,186	80	1,391	392	15,962	385	7,141	5	130
Maynard	701	c.i. & gal.	....	12.0a	110	3	180	30	974	30	972	2	5
Natick	8,976	c.i. & gal.	0	50.3	226	11	434	95	2,312	105	1,722	1	6
New Bedford	54,894	c.i.	7,632	153.8	1,583	0	1,981	332	13,694	1,792	9,998	177	....
Newton	9,396	c.i.	168	149.7	1,015	83	914	191	8,537	211	7,711	17	....
North Adams	2,300	c.i.	0	45.0a	325	0	3,600	39	3,750	7	87	9	75
Northampton	19,257	....	9,369	71.7	405	18	c	68	3,200a	9	117	7	....
North Attleboro	509	c.i.	0	26.6	257	8	542	9	1,354	9	1,354	0	12
Orange	1,300	....	0	15.0	136	2	105	22	862	22	862	0	9
Quincy	36,000a	....	9,786	126.0	925	50	1,634	436	8,176	1,331	6,130	12a	6a
Reading	807	c.i.	0	32.1	190	7	292	55	1,505	57	1,390	0	5
Revere	10,160	c.i., w.i. & cmt. ind.	0	50.6	228	28	483	189	3,809	337	1,605	0	10
Somerville	9,621	c.i.	1,654	97.3	1,099	83	1,566	264	12,596	638	7,164	7	....
Springfield	40,061	c.i. & stl.	7,105	195.1	1,466	....	4,238	422	13,407	1,556	9,970	395	....
Taunton	14,643	c.i.	0	92.5	1,008	47	717	140	5,420	126	2,938	22	....
Turners Falls	1,177	c.i.	0	14.8	86	3	132	8	561	3	33	1	39
Waltham	5,076	c.i.	0	56.7	476	....	851	68	3,969	50	682	6	8
Worcester	58,000a	....	....	....	2,377	....	3,647	725	18,271	740	17,551	306	275
Michigan:													
Alpena	7,779	c.i. & wood	900	36.0	241	1	....	68	2,711	9	64	0	5
Battle Creek	16,878	c.i.	0	65.0	682	2	554	404	5,920	....	5,769	5	12
Big Rapids	0	....	....	16.0a	150	4	75	....	....	....	0	0	3
Coldwater	5,280	c.i.	0	....	123	3	....	36	1,621	0	0	0	3
Detroit	240,462	c.i.	24,468	840.4	5,849	....	8,890	....	100,000a	1,059	10,807	59h	....
Flint	78,864	....	0	59.6	364	12	644	207	5,306	0	2,149	0	15a
Holland	6,884	c.i.	0	29.0	288	0	299	142	2,179	248	2,193	....	14

For footnotes, see page 824.

Table No. 3.—Distribution System Data. Municipal Plants. (Continued.)

Name of City.	Street Mains		Discon- tinued during year length, feet	Now in service, length, miles	Hy- drants now in service	Appliances for filling watering carts	Stop gates	Service connections		Meters		Motors and elevators supplied	Private fire con- nections
	Laid during year Length, feet	Kinds						Added during year	Now in service	Added during year	Now in service		
Michigan (Continued):													
Ishpeming	1,690	....	....	27.0	139	....	....	21	2,018	20	1,577	....	....
Jackson	2,811	c.i.	....	86.9	694	....	....	479	6,350	515	6,350	....	15
Kalamazoo	15,970	c.i.	....	81.1	695	0	1,584	....	6,400	572	6,364	....	16
Niles	3,200	....	0	....	190	5	....	60	1,100	7	301	7	10
Marquette	3,130	....	0	23.3	203	2	290	46	2,050	60	1,013	0	5
Muskegon	55,759	c.i.	0	61.7	652	0	592	289	4,736	161	1,819	13	12
Marshall	....	....	....	12.5	106	....	....	37	766	67	298	....	....
Owosso	5,828	....	....	25.5	190	11	220	84	1,675	82	1,627	....	7
Pontiac	15,916	c.i.	....	39.2	404	....	....	568	3,268	508	1,537	....	....
Saginaw	12,400	....	1,600	115.9	1,001	5	962	612	7,873	0	340	0	24
Ypsilanti	1,800	....	0	28.2	169	4	187	53	1,940	46	857	2	6
Minnesota:													
Albert Lea	13,000a	....	0	20.0a	123	9	150	132	1,054	140	910	0	3
Bimidji	2,000	c.i.	....	7.5	89	....	58	20	375	31	375	....	4
Chisholm	2,000	....	0	7.5	73	4	....	80	600	0	0	0	0
Cloquet	2,623	....	0	12.8	104	0	105	94	668	94	668	0	6
Lake City	3,000	c.i.	0	4.5	75	8	14	32	420	8	360	5	0
Minneapolis	134,376	c.i.	691	498.3	5,061	150	4,453	2,978	49,500	3,425	29,500	....	200
Owatonna	325	c.i.	0	14.0	106	7	94	60	950	12	65	c	4
Pipestone	0	....	....	5.5	48	....	....	26	387	83	387	....	14
Mississippi:													
Gulfport	900	c.i.	0	22.0	140	0	105	105	1,440	1	12	0	14
Jackson	30,000	....	0	56.0	515	7	315	420	4,150	1,400	1,650	5	12
Meridian	26,000a	c.i. & stl.	0	46.0	401	6	396	208	3,200	70	2,400	0	11
Yazoo City	771	c.i.	0	14.4	169	4	106	10	1,176	451	576	0	4
Missouri:													
Brookfield	0	....	0	8.0	54	2	16	35	448	35	448	0	1
Fulton	2,500	c.i.	0	12.0a	75	2	50	43	650	23	300	0	0
Higginsville	400	c.i.	0	2.3	37	....	9	35	180	10	27	....	6
Kansas City	200,640	c.i.	0	508.0	6,244	12	5,950	3,545	51,444	2,998	25,344	10	320
Macon	0	....	0	6.0a	40	0	18	12	300	5	180	0	0
Poplar Bluff	2,500	....	0	c	400	12	c	312	1,700	0	c	c	20a
St. Louis	165,800	c.i.	3,060	947.0	11,103	1,746	11,881	2,953	109,624	280	7,366	....	600a
Trenton	4,400	....	0	11.5	85	0	0	40	700	25	250	....	....
Montana:													
Helena	0	....	0	60.0	386	10	378	50	3,150	5	225	3	2
Nebraska:													
Hastings	1,000	c.i.	0	25.0a	151	0	50	125	2,400a	100	2,400a	7	6
Lincoln	23,760	....	0	81.5	680	12	....	608	8,950	504	8,225	2	21
New Hampshire:													
Claremont	1,687	c.i.	1,220	21.5	116	5	266	27	1,104	60	608	3	10
Concord	6,882	c.i.	1,672	69.6	430	41	1,011	43	3,752	99	2,243	10	15
Dover	166	c.i.	0	27.5	218	7	271	15	1,931	35	1,430	9	47
Keene	14,891	....	0	44.7	282	0	448	75	2,127	8	190	18	18
Somersworth	....	....	....	....	....	....	....	....	....	....	....	....	....
New Jersey:													
Madison	0	....	0	24.0a	165	0	....	....	....	....	....	....	....
New Brunswick	16,618	....	7,312	53.9	349	0	995	256	4,983	237	1,578	10	17
Perth Amboy	5,660	c.i.	....	219.4	308	0	400	326	4,102	135	1,366	f	....
Rahway	5,967	c.i. & un.	2,500	21.5	190	0	203	86	1,789	0	180	3	3
Salem	3,000a	....	....	8.5	82	....	53	25	815	2	9	0	0
Trenton	35,876	c.i.	0	145.0	1,015	0	....	817	22,800	300	681	0	25
New York:													
Binghamton	11,571	....	510	93.6	855	24	1,432	344	10,417	416	3,681	25	20
Buffalo	48,712	c.i.	0	564.2	5,326	0	10,066	2,049	79,309	343	3,702	50	240
Canadaigua	0	....	0	24.4	173	7	213	41	1,598	40	1,677	6	8
Carthage	1,000	....	0	37.0	82	1	50	30	695	10	300	1	3
Catskill	0	....	0	15.0	131	0	140	11	1,150	7	175	0	10
Cortland	8,198	....	0	24.6	218	1	198	104	2,407	106	1,530	10	14
Dansville	475	c.i.	....	15.7	127	1	140	35	900	0	4	0	3
Dunkirk	7,000	c.i.	0	24.8	199	0	c	75	3,197	75	3,188	0	9
Glens Falls	1,644	c.i.	900	36.7	332	0	442	296	3,372	28	40	2	6
Gloversville	5,000	....	....	38.7	346	....	462	102	3,877	1,106	3,630	3	40
Goshen	10,000	c.i.	0	....	77	2	3	30	800	0	5	4	1
Jamestown	38,200	c.i. & w.	3,000	92.0	465	2	....	449	7,600	1,600	6,200	6	100
Homer	2,000	....	0	8.0	55	0	50	27	500	3	78	1	2
Hudson	0	....	0	27.5	175	0	150	50	1,800	25	190	10	0
Kingston	9,788	....	0	55.0	479	10	416	157	6,255	15	123	15	10
Johnstown	2,600	c.i.	0	38.0	188	0	331	52	2,238	2	226	9	2
Little Falls	1,450	....	0	20.0a	150	....	250	20	2,102	24	331	0	9
Mechanicsville	c	....	0	c	91	0	....	....	....	....	900	1	5
Malone	600	c.i.	....	35.0	102	4	424	50	1,565	....	....	7	4
Newark	3,860	c.i.	....	15.7	149	....	....	....	1,109	....	....	....	3
No. Tonawanda	14,321	c.i.	0	50.0a	385	0	c	105	2,516	3	45	0	45
Ogdensburg	15,000a	c.i.	10,000	40.0	140	12	300	155	3,200	0	6	6	8
Ossining	5,000	c.i.	0	23.6	187	1	167	82	1,616	82	1,385	4	7
Peekskill	5,000	....	0	....	....	0	....	100	2,500	100	2,000	....	....
Salamanca	443	c.i.	0	13.3	87	1	110	60	1,400	3	28	0	7
Saranac Lake	3,246	univ.	0	18.0	155	11	233	65	1,100	0	0	9	25
Schenectady	23,845	....	0	97.0	1,403	2	2,290	500	12,000	200	275a	0	25a
Solvay	2,000	....	....	13.0	135	....	90	45	920	45	905	2	4
Syracuse	16,950	c.i.	....	206.0	3,162	30	2,897	1,100	24,893	1,100	24,390	68	....
Troy	13,362	....	800	83.7	1,074	0	1,982	200	11,462	10	301	150	100
White Plains	4,100	c.i.	0	41.7	384	0	419	132	3,648	181	3,582	5	14
Yonkers	32,366	c.i.	0	143.7	1,554	0	1,083	409	8,697	398	8,886	12	60
North Carolina:													
Gastonia	497	c.i.	0	10.1	74	0	29	49	715	87	377	0	11
Kinston	2,600	c.i.	0	13.0	93	0	75	125	600	120	580	1	6
Lenoir	....	....	....	8.0	100	....	....	50	200	25	60	2	1
Mooreville	0	....	0	1.0	13	0	10	13	53	6	25	0	0
Rocky Mount	4,900	....	0	14.0	121	0	97	114	1,428	236	825	0	4
Wilmington	0	....	0	34.2	230	24	277	506	3,570	61	1,390	2	15
North Dakota:													
Fargo	5,000	....	....	34.0	400	1	500	100	2,100	10	21	....	3
Grand Forks	0	....	0	26.0	252	0	300a	237	2,350	175	1,850	0	1
Williston	18,000	c.i.	0	11.9	73	2	71	120	996	41	240	4	10
Ohio:													
Bellaire	5,200	c.i.	....	....	187	....	....	44	2,006	0	29	3	....
Cincinnati	75,660	c.i.	22,345	671.1	c	0	c	2,194	53,560	3,890	25,489	381	250
Cleveland	89,576	c.i.	18,433	799.6	9,522	137	17,890	3,542	86,074	2,771	84,052	117	415
Coshocton	2,800	c.i.	0	25.0	159	2	198	47	2,430	3	47	178	16

For footnotes, see page 821.



Table No. 3.—Distribution System Data. Municipal Plants. (Continued.)

Name of City.	Street Mains		Discontinued during year length, feet	Now in service, length, miles	Hydrants now in service	Appliances for filling carts		Service connections		Meters		Motors and elevators supplied	Private fire connections
	Laid during year Length, feet	Kinds				Stop gates	Added during year	Now in service	Added during year	Now in service			
Ohio (Continued):													
Delphos	.....	.....	.....	16.5	95	0	.....	.....	1,127	.....	360	.....	.....
East Cleveland	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2,500	.....	.....
Elyria	.....	.....	0	52.0	400	2	1,108	188	3,400	100	3,400	1	10
Lancaster	13,000a	.....	0	25.0a	175	2	202	108	1,733	151	1,100	9	8
Mansfield	5,000	.....	0	45.0	320	0	380	200	4,600	150	1,800	0	40
Middletown	8,140	c.i.	760	27.5	287	.....	.....	304	2,720	418	1,450	3	21
Mt. Vernon	1,200	c.i.	0	16.6	146	0	112	40	1,800	10	200	4	1
Napoleon	330	.....	.....	12.5	106	.....	.....	25	560	30	560	.....	.....
Nelsonville	710	c.i.	0	8.6	93	3	28	21	928	0	0	12	0
Springfield	16,000	c.i.	0	104.0	722	0	1,164	450	9,640	500	2,000	4	24
Wapakoneta	1,400	c.i.	0	.....	119	.....	.....	50	760	45	550	.....	4
Youngstown	36,000a	c.i.	.....	142.0	1,480	.....	.....	1,700	4,500	1,937	4,392	.....	.....
Oklahoma:													
Enid	0	.....	0	.....	159	0	67	121	1,712	121	1,712	0	0
Guthrie	0	.....	0	22.0	130	8	100	14	1,363	36	875	5	18
Okmulgee	3,000	c.i.	0	22.0	92	0	52	105	850	250	850	2	3
Oklahoma City	10,825	.....	0	148.4	795	12	815	257	9,934	234	7,172	0	8
Ponca City	5,000	.....	0	.....	70	5	c	15	575	15	575	0	1
Oregon:													
Oregon City	10,000a	c.i.	.....	10.0	110	0	.....	100	1,000	.....	.....	0	.....
Pennsylvania:													
Bradford	0	.....	0	37.8	281	0	c	28	3,883	4	116	3	15
Chambersburg	3,852	.....	.....	36.0	142	0	96	157	2,467	66	400	0	1
Grove City	2,200	c.i.	.....	6.0	110	1	.....	40	1,200	40	1,056	.....	.....
Harrisburg	13,827	c.i.	.....	88.0	1,071	.....	1,967	506	17,152	435	11,102	22	.....
Homestead	0	0	0	15.0	135	0	120	67	2,200	25	500	0	15
Lancaster	3,763	.....	.....	72.0	680	0	.....	218	12,100	480	4,354	17	21
Lebanon	0	.....	0	50.1	208	0	461	176	4,700	4	117	42	15
McKeesport	7,193	c.i.	0	65.0	470	0	842	150	5,950	568	3,839	1	7
North East	0	.....	0	12.0	60	0	64	30	750	12	60	0	6
Oil City	5,912	c.i.	0	36.0	278	0	265a	72	3,048	388	3,898	17	9
Reading	7,846	c.i.	14,268	113.7	985	0	3,002	289	22,792	394	4,177	945	113
Shenandoah	2,180	univ.	0	.....	3,800	0	350	75	.....	175	195	0	0
Steelton	1,600	c.i.	0	17.0	124	0	350	68	1,800	200	1,650	.....	3
Titusville	3,000	.....	0	25.0	152	0	.....	50	2,000	5	100	0	1
Rhode Island:													
Pawtucket	34,561	c.i.	14,628	184.4	1,143	42	.....	305	11,266	395	9,893	.....	.....
South Carolina:													
Abbeville	0	.....	0	6.0a	64	0	40	15	320	22	.....	0	3
Florence	750	.....	0	16.0	145	5	c	122	936	75	692	.....	7
Orangeburg	0	.....	0	13.4	133	7	.....	60	780	55	365	0	5
Rock Hill	0	.....	.....	.....	69	0	34	165	750	165	750	1	5
Union	400	.....	0	12.0	72	0	48	42	300	42	300	0	6
South Dakota:													
Aberdeen	5,442	.....	.....	24.1	158	0	300	57	2,500a	0	0	.....	.....
Mitchell	7,563	c.i.	0	11.0	81	2	55	70	525	70	525	0	2
Rapid City	37,000	c.i. & wd.	.....	13.0	75	1	70	40	800	50	550	.....	2
Tennessee:													
Clarksville	800	c.i.	.....	12.0a	131	0	25a	50	1,000	30	155	1	8
Dyersburg	7,900	.....	0	8.0	95	4	50	20	400	4	30	1	10
Texas:													
Denton	4,000	c.i.	0	21.0	108	1	60	75	1,000	200	700	.....	4
Houston	25,026	c.i.	0	105.3	889	.....	1,052	521	7,875	.....	8,131	.....	.....
Longview	0	.....	0	5.0	75	0	25	50	600	50	575	0	25
Sherman	10,000	.....	.....	28.0	258	.....	132	205	3,284	150	2,900	.....	16
Waxahachie	0	.....	0	11.2	78	0	72	.....	1,550	66	935	0	10
Utah:													
Logan	11,987	c.i.	0	22.0	116	10	.....	100	1,100	20	20	0	8
Ogden	12,514	Matheson	...	51.3	144	52	.....	316	5,502	20	302	1	12
Salt Lake City	43,266	.....	0	220.6	1,800	0	.....	689	17,619	179	783	83	30
Vermont:													
Burlington	586	.....	0	41.9	247	.....	709	42	4,009	79	3,503	42	.....
Montpelier	5,032	c.i.	.....	28.3	130	9	262	.....	.....	.....	.....	.....	.....
Rutland	1,084	c.i.	0	.....	169	1	584	44	2,879	23	150	1	2
Virginia:													
Clifton Forge	0	.....	0	10.0	55	4	30	25	1,175	2	12	8	0
Harrisonburg	1,560	.....	.....	12.0	1,200	6	128	50	1,299	20	70	6	10
Marion	7,900	c.i.	2,600	7.0	28	0	20a	15	600	.....	.....	0	6
Richmond	65,674	.....	.....	175.7	1,239	.....	.....	1,970	26,127	2,104	17,460	.....	.....
Winchester	1,500	.....	.....	22.0a	120a	.....	95	80	1,800	0	8	.....	3
Washington:													
Port Townsend	8,400	wood	.....	47.0	68	2	87	35	914g	.....	27	.....	2
Seattle	123,235	c.i.	.....	615.9	5,108	8	4,638	2,150	41,163	3,631	31,539	100	c
Spokane	88,728	.....	12,722	367.2	2,142	.....	2,630	689	24,663	3,351	7,690	.....	139
Walla Walla	3,070	.....	0	55.7	284	.....	447	79	3,659	57	182	3	9
West Virginia:													
Keyser	0	.....	.....	.....	48	0	.....	250	4,000	250	1,500	10	12
Parkersburg	10,560	.....	0	30.0	310	0	460	.....	.....	.....	.....	.....	.....
Wisconsin:													
Baraboo	2,200	.....	0	2.5	146	1	51	32	1,040	58	486	0	2
Eau Claire	12,901	c.i.	0	40.7	430	0	300	120	2,845	.....	1,690	0	7
Grand Rapids	7,228	.....	.....	17.9	110	0	125	55	759	39	290	1	0
La Crosse	17,738	.....	1,760	61.0	532	10	.....	298	4,578	358	2,062	0	9
Milwaukee	61,628	c.i.	0	495.7	3,340	0	3,614	2,272	58,357	2,366	57,657	234	125
Monroe	360	.....	.....	8.7	92	2	12	45	540	70	553	0	2
Oconomowoc	0	.....	0	8.5	65	0	67	82	424	38	396	2	0
Watertown	1,081	c.i.	0	20.4	178	0	152	59	1,189	72	1,183	7	10
Waupaca	2,520	c.i. & wi.	.....	9.7	78	3	67	36	500	4	20	2	.....
Wausau	2,160	c.i.	700	37.5	256	0	426	96	2,342	5	105	0	4
West Allis	26,000a	.....	0	26.0	328	0	150	250	1,100	150	1,115	0	8
Canada:													
Branford, Ont.	22,866	c.i.	0	54.3	297	73	433	437	6,118	275	706	24	26
Calgary, Alta.	242,880	steel	.....	167.0	792	25	2,000	520	7,479	9	36	8	8
Kingston, Ont.	3,854	c.i.	0	33.4	266	13	.....	136	4,093	40	102	5	11
Lethbridge, Alta.	16,368	stl. & c.i.	0	36.5	220	4	293	230	2,090	10	50	0	.....
London, Ont.	11,053	c.i.	0	107.5	703	0	747	342	13,270	376	1,664	c	30
St. Catharines, Ont.	22,000j	c.i.	0	47.8	341	.....	547	324	3,974	22	128	6	29
Toronto, Ont.	126,450	.....	0	457.8	5,190	0	4,317	6,491	90,432	187	3,524	256	365
Winnipeg, Man.	69,590	c.i.	.....	238.3	1,890	.....	3,600	3,317	29,405	2,487	24,481	.....	135

a—Approximately. b—To all factories. c—Not known. d—Also 649 fire cisterns. e—One service and meter serves two or more premises in some cases; about 54,000 premises served. f—Motors and elevators metered. g—Two of these are U. S. forts. h—Elevators only, no record of motors. i—Metering 13,719 taps. j—Also 4,200 feet of 5-foot by 7-foot rock tunnel.

TABLE NO. 4.—DISTRIBUTION SYSTEM DATA. PRIVATELY OWNED PLANTS.

Name of City.	Street Mains.				Hydrants now in service.	Appliances for filling watering carts.	Service Connections.			Meters.		Motors & elevators supplied.	Private fire connections.	
	Laid during year.	Discontinued		Now in year, service.			Stop gates.	Added during year.	Now in service.	Added during year.	Now in service.			
		Length.	Kinds.											length.
<b>Alabama:</b>														
Bessemer .....	.....	...	...	...	58	4	...	...	1,100	...	24	1	3	
Florence .....	.....	...	...	...	121	1	95a	...	...	...	...	..	7	
<b>Arkansas:</b>														
Helena .....	2,600a	...	0	18.0	106	0	75a	50	1,406	100	800	2	6	
<b>California:</b>														
Pomona .....	6,650	w. i.	0	...	246	0	c	50a	3,200a	75a	1,900	1	25	
Riverside .....	15,539	...	...	...	122	..	...	175	3,100	12	388	..	..	
<b>Connecticut:</b>														
Bristol .....	3,961	...	3,360	40.0a	130	1	286	55	1,848	113	1,351	12a	30a	
Naugatuck .....	3,300	...	...	40.0	198	..	314	34	1,531	...	...	..	..	
Torrington .....	4,800	...	0	40.0	150	0	380	97	2,453	90	179	0	27	
<b>Illinois:</b>														
Kankakee .....	5,000a	...	...	...	235	5	50	300	3,500	50	300	0	10	
Peoria .....	17,957	c. i.	187	111.0	1,376	0	973	664	10,700	0	365	16	35	
Quincy .....	10,883	...	55	65.8	407	0	569	163	6,246	214	3,483	3	..	
Streator .....	5,780	...	0	37.0	281	2	307	128	3,640	49	420	0	17	
<b>Indiana:</b>														
Linton .....	1,987	...	0	10.3	79	1	64	50	1,250	6	68	0	0	
Richmond .....	5,845	c. i.	...	43.5	323	2	360	202	4,811	215	3,041	4	46	
Terre Haute .....	12,144	...	...	89.6	1,078	..	...	268	5,960	68	2,093	17	31	
Valparaiso .....	2,165	...	0	22.2	142	2	117	36	1,417	64	723	3	0	
Vincennes .....	0	...	...	...	275	..	...	...	...	...	300	..	7	
<b>Iowa:</b>														
Des Moines .....	44,613	c. i.	0	159.3	1,664	0	1,121	865	1,504	733	14,553	..	..	
Iowa City .....	1,200	...	0	19.5	208	1	127	34	1,415	55	117	0	0	
<b>Kansas:</b>														
Atchison .....	7,754	c. i. & w. i.	0	33.9	182	2	258	116	2,351	43	347	2	4	
Leavenworth .....	0	...	...	...	144	2	...	c	....	...	....	..	15	
<b>Kentucky:</b>														
Frankfort .....	0	...	0	17.0	131	..	200	25	1,750	20	100	7	6	
Lexington .....	12,200	c. i.	0	74.4	605	15	735	496	5,613	420	5,380	4	6	
Maysville .....	5,000a	c. i.	0	14.5	80	0	90	40	1,200	0	100	10	12	
Paris .....	0	...	0	12.0	114	0	90	40	1,000	0	30	6	1	
<b>Maine:</b>														
Biddeford .....	10,759	c. i.	0	64.0	213	..	...	139	4,118	90	412	0	8	
Skowhegan .....	1,300a	c. i.	...	12.0	81	1	51	20	654	...	374	..	3	
<b>Maryland:</b>														
Hagerstown .....	14,460	c. i.	0	53.0a	104	4	315	165	4,385	18	620	3	9	
<b>Michigan:</b>														
Escanaba .....	650	...	0	22.0	221	2	180	75	2,000	8	400	0	3	
Menominee .....	0	...	...	27.5	296	2	297	31	1,950	42	638	..	..	
<b>Minnesota:</b>														
Crookston .....	998	c. i.	0	8.0	94	..	...	100	1,000	100	1,000	1	10	
Rochester .....	3,250	...	...	14.1	200	0	47	200	1,300	180	900	..	7	
<b>Missouri:</b>														
Chillicothe .....	0	...	0	...	134	1	24	50	1,000	50	650	0	0	
<b>Montana:</b>														
Anaconda .....	0	...	0	16.5	89	9	0	...	1,700	0	0	55	0	
Livingston .....	0	c. i.	0	12.8	111	2	133	41	1,236	0	55	0	30	
<b>New Jersey:</b>														
Montclair .....	10,857	c. i.	...	80.7	595	20	627	210	4,763	161	4,260	..	15	
West Orange .....	8,859	c. i.	0	31.7	261	0	116	112	1,801	123	1,702	0	1	
<b>New York:</b>														
Elmira .....	13,121	c. i.	0	95.6	513	0	...	305	7,712	290	3,559	0	8	
Mt. Vernon .....	18,480	c. i.	0	85.0	675	0	900	273	5,988	200	5,900	0	12	
New Rochelle .....	.....	...	...	...	876	..	...	240	6,680	...	...	..	..	
Norwich .....	3,390	...	0	19.2	60	0	...	70	2,020	0	8	3	..	
<b>North Carolina:</b>														
Durham .....	.....	...	...	...	215	5	225a	...	3,150	...	1,380	1	..	
Raleigh .....	.....	...	...	25.0	172	0	166	...	3,066	...	729	3	16	
<b>Ohio:</b>														
Delaware .....	0	...	0	23.2	262	0	165	39	1,660	54	1,015	2	2	
<b>Pennsylvania:</b>														
Chester .....	25,994	c. i.	0	105.0	0	0	176	538	9,393	10	1,818	0	30	
Hanover .....	.....	...	0	...	130	0	...	...	...	...	100a	..	20	
Indiana .....	.....	...	...	18.0a	82	0	...	50a	1,199	35	600	..	4	
Pittsburgh b. ....	11,080	c. i.	0	151.0	663	0	2,308	311	12,834	301	12,706	13	11	
Plymouth .....	.....	...	...	30.0	97	..	...	...	...	...	...	..	..	
<b>Texas:</b>														
Commanche .....	68,640	...	...	13.0	31	2	...	42	415	42	415	..	5	
Laredo .....	26,149	c. i.	13,580	15.3	135	0	134	122	1,321	81	367	0	4	
Palestine .....	.....	...	...	24.0	133	5	25	150	1,200	100	276	..	3	
<b>Wisconsin:</b>														
Ashland .....	4,244	...	0	30.6	247	0	179	77	2,224	58	543	0	6	
Green Bay .....	12,373	c. i.	...	54.3	416	0	564	112	4,513	1,343	1,410	0	9	

a—Approximately. b—Supplies part of Pittsburgh, also Wilkesburg, Edgewood, Swissvale, North Braddock, Rankin, East Pittsburgh, Turtle Creek, Wilmerding, Pitcairn, Trafford, Braddock, Patton, North Versailles. c—Not known.



# NEWS of the MUNICIPALITIES

Current Subjects of General  
Interest Under Consideration

by City Governments  
and Department Heads

## ROADS AND PAVEMENTS

### Brick Street Bursts Open.

Muncie, Ind.—Brick expansion, due to heat, caused an explosion in the pavement of West Jackson street at the intersection with Celia avenue in Normal City which tore a hole in the street 25 feet long and 10 feet wide. It was thought at first that it was an explosion of sewer gas, but it is the opinion of officials that the brick at this point were too close together and there was no room for expansion due to the sun's heat.

### Road Work Is Started.

Redwood City, Cal.—Work has been started on the State highway between Redwood City and Palo Alto. The contract for the construction of this four-mile stretch has been awarded to the Federal Construction Company, which plans to complete the work within four months. The highway is already paved from San Bruno to Burlingame and contracts have been let for nearly all of the remaining portions in the county.

### Eight Miles of Pavements Laid.

Mishawaka, Ind.—The paving with asphaltic concrete of the four avenues in the east end has been finished, making an approximate total of eight miles of streets of Mishawaka now paved. The paving contractors have transferred their force of workmen to the East Second street job, where the first block of concrete base from Beiger street west was laid. This will approximate three-quarters of a mile long. Weather conditions favorable, the asphalt will probably have been laid complete from the end of the present paving east to Beiger street by the middle of July.

### Good Roads Day Set for June 17.

St. Paul, Minn.—Governor Eberhart, in accordance with a law passed at the last session of the legislature, issued a proclamation designating June 17 as "Good Roads day." His proclamation follows in part: "The state of Minnesota has 50,000,000 acres of excellent land and 3,500,000 acres of beautiful lakes, which, when made accessible by improved roads, will make of Minnesota the garden spot of the world and the playground of the nations."

### Paving at Taylor.

Taylor, Tex.—The paving of West Second street with creosoted blocks has been completed by Okander Bros., the contractors of Waco, and that thoroughfare has been opened to the traveling public. This marks the completion of six of the nine blocks included in the paving contract, and the entire forces of the contractors are now employed on East Second and Third streets. Five blocks of East First and Main streets have also been completed, and these thoroughfares are now open to travel. Negotiations are pending for the further extension of the street paving work.

### Inspect Roman Road Pavement.

Waterbury, Conn.—Mayor Reeves and City Engineer Cairns are back from Worcester, Mass., where they made an inspection of the Roman Road paving material, which is used extensively on the principal thoroughfares of the Massachusetts city. Mayor Reeves said that miles and miles of the paving material were inspected and that the material is giving satisfaction in Worcester. The board of public works deferred awarding the work of paving Willow street, which was to be laid with Roman Road material,

when a rumor reached them that the material had been unsatisfactory after a trial at South Norwalk. The mayor and city engineer were appointed a committee of two to investigate the practicability of the material where it has been used and the trip to Worcester was with this end in view. The material has been laid for four or five years in Worcester and is giving good service. The dissatisfaction at South Norwalk was due to the fact that the material was laid in the cold weather. The committee will probably present a report to the board of public works favorable to the Roman Road material for Willow street.

### Autoists Work for Great Highway.

Fremont, Neb.—Two hundred automobilists from seven states met in Fremont to organize for the purpose of building an automobile road between Chicago and San Francisco. Officers of the Central Transcontinental National Highway Association were present and assisted in organization work. Of those present about fifty delegates came by train from distant points. Illinois, Indiana, Ohio, Nebraska, Iowa, Colorado, Wyoming and Utah were represented. Resolutions were adopted to ask Congress for assistance in the work, but not to wait for that assistance in starting the work in each state on the road.

### City Builds Solid Concrete Highway.

Indianapolis, Ind.—The city of Indianapolis will soon have a sample of fine road construction to show to the country, work having commenced on Myers Boulevard, which will convert a part of that thoroughfare into a solid concrete highway. First class concreting material will be used in the construction of this road, the sand and gravel being selected with the greatest care. Blaine Miller, an expert highway engineer, will have charge of the work, and he will have the assistance of C. D. Frank, assistant engineer of the Universal Portland Cement Company, of Chicago, who will act in an advisory capacity. Indianapolis good road enthusiasts are taking great interest in the work, being on hand every day to watch the laying of the concrete.

### Private Contractor Could Do Job for Far Less.

Trenton, N. J.—Using convict labor to repair public roads has been found to be a very costly experiment in this country. The small stretch of road between Broad Street Park and the White Horse tavern that was repaired by the convicts last fall is said to have cost the county and state upwards of \$2,000, while the same work could have been done by any contractor for about \$200. Because of the lack of any definite figures, as to the cost, at either the county or state offices, the exact amount is not to be had, but State Road Commissioner Stevens readily admits that the cost of road construction has not been lessened by the utilizing of the services of the convicts. Just what the county paid for teams and other incidentals is not known, owing to the usual hazy methods that have prevailed in the county road department. But that there was a free use of teams and materials and that the experiment was costly to both the county and to the state is freely admitted by everyone who is in any position to know about the situation. It was the first experiment in which convicts were used, and it cost the state an average of \$1.75 a day for each convict employed, numbering sixteen in all. The daily cost of \$1.75 a man included transportation, feeding and guarding. For the use of each convict the State Road Department was obliged to pay the Prison Labor Commission fifty cents a day. The service of two guards cost \$88 per month, and the meals were served the

convicts at the White City Hotel at a cost of 35 cents per man. The above costs to the state is in addition to the costs of materials, team hire and services of inspectors to the county. What the exact amount the county had to pay for the state's experiment with convict labor could not be ascertained. The bills for materials and team hire on the road were not specified as having been used in connection with the experiment, but followed in the usual course of road repair bills. It is likely that there will be a public investigation of the county road department soon. When the resolution granting the state permission to experiment with convict labor on a county road was passed by the Mercer County Board of Freeholders, the general impression was to have a road repaired without cost. In consequence of this opinion, the resolution met little opposition. Although the state is about to erect three convict camps in different sections of the commonwealth, the general opinion prevails that further experiment with convict labor will prove a failure.

#### Road Inspection Tour.

Albany, N. Y.—To determine the types of roads needed for the different parts of the state, Commissioner John N. Carlisle of the highway department, and Col. William De H. Washington, Harold Parker and George C. Diehl, the committee of advisory engineers, have started on an inspection trip. The party will tour the northern counties first. Arrangements have been made to have the members of the legislature, the local highway officials, good roads committees of the boards of supervisors, and all others interested in highways meet the investigators. The engineers next will visit Long Island. Mr. Carlisle has been told by experts that the conditions there may be the most troublesome, owing to the soil and heavy automobile traffic. Pending a report, roads in need of immediate repair will be improved.

#### Commence Work on Cement Highway.

Kalamazoo, Mich.—Work on the half-mile stretch of cement highway on the Gull road has been started, the work being done by city prisoners. This cement road will be the first of its kind ever laid in Kalamazoo County. The Gull road is one of the heaviest traveled highways in this part of the county, and Road Commissioners Bryant and Bohnett consider that this stretch will be an ideal place to try the cement construction's durability. Commissioners Bryant and Bohnett have made plans for another stretch of excellent highway one and one-quarter miles in length, running from Galesburg to Scotts and then south to Fulton. The material will be obtained from the farms nearby, where there are many small granite boulders. The stones will be hauled and distributed along the road by the farmers and two stone crushers will then be sent over the route. Meanwhile the roadbed will be graded, shaped and rolled. The stone will be then placed and rolled in. The road will be completed by August.

#### Highway Work Makes Progress.

San Bernardino, Calif.—Within a day or so contractors at work on the extension of Brand boulevard, which is being connected with Sherman way and Van Nuys, will begin spreading asphalt on the first mile of the new highway. The work of grading the other four miles has been completed and a large force of men is now rushing the concrete work for this section. It was planned originally by the Angeles Mesa Land Company and the San Bernardino Mission Land Company, which are bearing the expense of the work, to have the boulevard open for use when the aqueduct celebration takes place. Although the celebration has been delayed, the original plans for the boulevard will be carried out. Brand boulevard extension is one of the most expensive pieces of road construction in California. Two hundred thousand dollars is the amount appropriated for the five-mile strip. The boulevard is 130 feet wide. It runs on either side of the Pacific Electric tracks to this city, and is in reality two distinct roads, one for automobiles exclusively and the other for auto trucks, heavy wagons and horse-drawn vehicles generally. The auto road is 30

feet wide and is being paved with asphalt. The heavy-teaming road is 25 feet wide and is macadamized. A 25-ft. parking extends along the outside line of each roadway. Rose bushes, palm trees and other trees and shrubs of an ornamental character are being planted in the parkings.

#### Will Pave 150 Blocks in Corpus Christi.

Corpus Christi, Tex.—Work has started on the largest single paving contract ever let by a Texas municipality. It calls for the paving of 150 blocks of Corpus Christi streets at an estimated cost of a half million dollars. It is thought that the entire contract can be completed by next January 1. This contract was given last September to the Texas Bitulithic Company. The actual paving work has been delayed for several months, giving property owners ample time to provide for sewer connections. The first work will be in placing curbing and guttering and the concrete and paving crews will follow immediately thereafter. Corpus Christi uses the law known as the assessment lien act as passed by the thirty-first legislature. Under this plan the city pays one-fourth of the cost and abutting property owners pay the remaining three-fourths.

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## SEWERAGE AND SANITATION

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#### Collect for Sewers Under State Roads.

Harrisburg, Pa.—Gov. Tener has approved two bills which give first-class townships permission to lay sewers under county and state roads and to collect the cost from property owners benefited. Townships are also permitted to grade, pave and improve any highway. The maps or plots are to be approved by the township commissioners before being recorded.

#### May Sell Sewage Farm.

Pasadena, Cal.—The 530-acre municipal farm, owned by the city of Pasadena, and situated near San Gabriel, may be sold by the Board of City Commissioners and the money utilized for the building of an outfall sewer line to the sea. The commissioners are considering the subdividing and sale of the farm. Alhambra already has offered \$50,000 for thirty acres near that city. It is the belief of the commissioners that close to \$1,000,000 can be realized from the farm. Under present conditions the only use which the city makes of the farm is to dump its sewage there. It has been a financial loss for years. The city purchased 160 acres of the farm ten years ago for \$150 an acre. The same land is now valued at from \$1,500 to \$2,500 an acre.

#### Typhoid on the Increase.

Cumberland, Md.—It is reported that typhoid in Cumberland is alarmingly on the increase and unless care is taken in the use of water the city may enter again into such a seige of the disease as held it in its grip two years ago and caused the death of many local people. Health Officer F. E. Harrington has displayed figures which showed that there was 40 cases in the five weeks of May, this year, as against 13 cases reported in four weeks of May and one of April last year. The past April showed a record of 35 cases as against 15 in April, 1912, and 4 cases in April, 1911. Dr. Harrington is of the opinion that most of the disease is caused from the drinking water in use in the city and advises the boiling of all water as a means of prevention.

#### Big Sewer Contracts Are Reported Finished.

Erie, Pa.—Several large sewer contracts have been completed, according to reports made in the city engineer's office, and the retaining wall on the west side of State street, between Front and Second streets, has been finished. Contractor Frank J. Eichenlaub has finished the 30-inch storm water sewer in Twenty-ninth street from Cherry street to a point 600 feet west of the city limits. Joseph McCormick & Bro. have finished their contract for the 24-inch storm water sewer from Fourth to Cranberry, Twelfth to Raspberry and in Cascade street. The same contractors have also completed the 12-inch sanitary sewer in Ash



street, between Twenty-sixth and Twenty-eighth streets. The 9-inch sanitary sewer in Perry street, between Sixth and Seventh streets has been finished by Contractor C. Wolfram, who is finishing the sanitary sewer in Perry street, between Twenty-fifth and Twenty-sixth streets.

#### Work Will Be Resumed on Intercepting Sewer.

Syracuse, N. Y.—Consulting Engineer Flannery, of the United States Fidelity and Guaranty Company, of Baltimore, with George H. McGuire, agent for the company, probably will make arrangements with the intercepting sewer board to take charge of the Fitzgerald contracts. Nothing can be done by the company until the board formally declares the contracts abandoned and directs that work be done. This action, members of the board said, will be taken at a meeting, and five days' notice will be served on the company and John Powers, of Chicago, the executor and trustee under the will of William Fitzgerald. The same procedure was taken on the contract of the Reed-Coddington Engineering Company, which had the contract for the improvement of Onondaga creek. In that case the board readvertised and let a contract to Mr. Fitzgerald. After the expiration of the five days given in the notice the board and bonding company can enter into negotiations, and it is believed that the company will arrange with another contractor to finish the operations or consent to the board completing the work. The company is liable for any extra cost and will have to look to the Fitzgerald estate to reimburse it.

### WATER SUPPLY

#### Break Discovered in Submerged Pipe.

Marion, Mass.—Water to the amount of nearly 1,000,000 gallons has been wasted in Marion during the past month, due to a large hole in the conduit pipe leading from the mainland to Ram Island. For the last three or four weeks the water pressure in the town has weakened a great deal, and upon examination it was found that the water in the water tower lowered between 7 and 8 feet each night. The water tower was carefully examined for any leak. Finally the pressure was taken at various points in the town and that at Ram Island was found to be so low that the conduit pipe, which was under water, was examined. A hole which measures 2 feet long in the pipe, which lies in 25 feet of water was found. A diver from the city is now at work on the damaged pipe.

#### Favor One Big Well.

Kinsley, Kan.—The new city council has gone on record as favoring one large well to numerous smaller wells for obtaining the local water supply. Small wells, scattered over the city, have been tried for several years but are not satisfactory. At the time of their installation it was thought they would give more equal pressure and purity to the supply in all parts of the city. The one well system will be re-established.

#### Refuse to Vote on Water Proposition.

Saginaw, Mich.—Any hope that city might have held that Saginaw would soon be given the opportunity of voting on the plan to bring a supply of water from the Saginaw bay, was dashed aside in the common council when that body adopted a report from the committee on charter amendments which blocked the proposition under the guise that the city could not legally vote bonds enough to pay for the plant, etc. The adverse report had been expected from remarks and investigations made by the members of the committee. The Saginaw Bay Water Association through former secretary, J. P. Tracy, asked the council some time ago to put the question of bay water before the people for a vote. The communication was referred to the charter amendments committee, consisting of Alds. Seemann, Madden, Ardern and Zahnaw and City Attorney Snow and City Controller Warren. This committee has had the matter under consideration for some time. The report submitted states that the approximate cost of bringing the water to the city would be over a million and a half dol-

lars. In the end the plan would involve nearly \$2,500,000, according to the report. The committee believed it would be a useless expense to put the plan to a vote, but that it would be in favor of giving the electors a chance to register their voice but for the fact that the available bond issue under the present charter is only \$900,000 and if the new charter is adopted the available bond issue will be \$800,000. The fact that the limit of bond issue would fall very short of the amount needed is information furnished by the city attorney.

#### 15,000,000 Gallons of Water Flow into Reservoir Daily.

Akron, O.—East Reservoir, one of the largest bodies of water in the Portage chain of lakes, which was drained when the dam broke in the recent flood, is filling at the rate of 15,000,000 gallons per day. This is the report received by Engineer E. G. Bradbury, city water expert, from Engineer J. H. Vance of the Goodrich Rubber Company. Mr. Vance gauged the inpour into the reservoir, and figures show that the immense depression in the earth is filling at this rapid rate. If the present inpour continues, the reservoir will be filled within a month or six weeks, roughly estimated by Engineer Bradbury. The large volume of water is flowing through the race coming from Pleasant Valley. It is carried over the new gully through the flume and into the reservoir. It is said that since the rains the flume is running almost full.

#### Lansing Water Works Made Money Last Year.

Lansing, Mich.—The record of the municipal water works plant the last year is a good argument for municipal ownership advocates. During the year the plant's receipts were \$94,884.61 and the expenditures \$71,063.13, leaving a balance of \$23,821.48. Of the expenditures, \$34,877.59, or nearly half, was for improvements. The plant has 79 miles of water mains in the city.

#### Frankston Waterworks System.

Frankston, Tex.—Frankston now has a deep well with an abundant supply of water. The pump is installed and upon the arrival of the engine and pipe for mains a fine system of waterworks will be complete.

#### Tacoma Water Plant Damaged.

Tacoma, Wash.—Three serious accidents that will entail an expenditure of \$15,000 to remedy have occurred on Tacoma's two big light and water projects within the past few days. Either dynamite or lightning destroyed the lower half of a 45-inch wooden waste water pipe, splintering it to slivers; a half dozen plates on the floor of the reservoir at La Grande were cracked and practically the same thing happened at the big reservoir at McMillan, on the Green river gravity system. City authorities are non-committal, other than to say that an investigation is in progress.

#### Omaha Has Pure Water.

Omaha, Neb.—The new filtration plant for the city water system, constructed upon the St. Louis plan, has been put in use. The Missouri river water furnished to the citizens of Omaha can scarcely be recognized. Solids and impurities have simply ceased to exist in the water and for the first time in its history Omaha has pure water. Some time ago the Omaha board sent its engineers to a number of cities to investigate methods of purification. That in use at St. Louis was adopted as the best of all and was ordered installed in the Omaha plant.

#### Presents Report on City's Wells.

San Francisco, Calif.—City Engineer O'Shaughnessy has completed a report on San Francisco's underground water supply, showing that the quantity now drawn from this source is about 8,500,000 gallons per day and that about 3,800,000 gallons additional can be developed. M. J. Bartell, hydraulic engineer, who compiled the data, states that about 700 wells were examined, this being over 90 per cent. of the number in the city. The yield of the Golden Gate Park water works and the amount of water taken from Lobos creek by the War Department are included in the above

figures. Chemical and bacteriological analyses of the water from various wells were made by R. P. McIntosh, assistant hydraulic engineer, who reports that some of the water sampled showed more or less contamination and was unfit for drinking. He says: "In any locality where the city decides to sink a well samples from wells in the vicinity should be secured from time to time and a close record kept of the results of analyses, depth of water and condition of the casing. It is believed that if the well is deep and the casing tight so as to exclude surface sewage the supply will in general be good and the chance for contamination reduced to a minimum."

#### Water System for Town of Kittitas.

Kittitas, Wash.—The town of Kittitas, six miles east of Ellensburg, on the Milwaukee railroad, is to have a water system. This was a decision reached at a meeting of the residents of the town. Some \$20,000 is to be expended by the Clerf estate of Ellensburg in piping the water of Warm Springs, a distance of three miles, to the town. The Clerfs control practically the only large springs of any value in the eastern end of the valley, and at the meeting in Kittitas, Miss Christine Clerf outlined a plan which was unanimously favored. The town has been in existence only a few years, since the building of the Milwaukee railroad through the Kittitas valley, but has grown from a mere stopping place to a town of nearly 500 inhabitants. Milwaukee trains take on "helper" engines at Kittitas to assist them over the grades of the Saddle mountains, between Kittitas and the Columbia river. Abundant water has been found at a depth from 10 to 15 feet, and this has been used by a majority of the townspeople. The Milwaukee has a deep well at Kittitas, capable of supplying 3,000 persons, but as the residents believe that their town will reach 10,000 after the completion of the high line canal, a proposition to install a pumping plant did not meet with favor.

#### Improving Burlington's Water System.

Burlington, Ia.—Superintendent Frank Lawler of the Citizens' Water Co. states that considerable progress is being made at the site of the new settling tanks near the present water company equipment. Many tons of earth have been transferred toward the river side by the huge derrick that is at work there, and Mr. Lawler states that the work of throwing rock will be begun. Mr. Lawler states he is not sure when the big job will be concluded, as it is in a most immature stage now, but by late summer or early fall it is expected that the mammoth undertaking which is to so greatly improve Burlington's water supply will have been consummated. The work involves the expenditure of more than \$30,000, but it is easily worth it, according to the company officials, as it will better the entire system in a way and will permit of an extension of water mains in parts that cannot now be reached.

#### Water Waste Decreased.

Philadelphia, Pa.—Director Cooke's fight to cut down the waste of filtered water is showing splendid results. Instead of being strained to their capacities, the filter plants, with the lessened demand, are operated under more reasonable conditions and much more economically both in the matter of wear and tear and coal consumption. With the completion of projected extensions to the Belmont filter plant out of the \$300,000 included for the purpose in the new \$7,000,000 loan, it is expected that the filtration system will be ample to meet the demands of the community for the next decade at least, if measures to prevent waste are rigidly maintained. In cutting down the waste, which was declared to be the greatest in any city in the country, the Water Waste Exhibition, held in City Hall courtyard last fall as an educational measure, is believed to have been a big factor. At the same time, the Water Bureau's inspectors have made house to house inspections to stop leaky spigots. Leaks in water mains also have been stopped and every means used to reduce water waste. While savings have been effected in operating expenses, increased water revenues have been secured as a result of inspections of all buildings for tabulation of fixtures

or water outlets. About 20 per cent. of all buildings have been inspected so far, and hundreds of spigots and other fixtures found on which no taxes had been collected. The net revenue gain by fixture charges not previously paid was for the first four months of this year upwards of \$73,000. As showing the reduction in water waste, the Bureau records show that during the last ten years the per capita daily consumption has been reduced to 170 gallons. In West Philadelphia the consumption rate has been cut down from 170 gallons to 125, although Chief Davis claims that this section never had a better supply. Comparing the four months of last year and this the total output of the filter plants required to meet the demands was 39,000,000 gallons in 1912 and 34,400,000 gallons this year, while the coal consumption for the same period in 1912 was 55,000 tons, as compared with 45,800 tons this year.

#### Oak Cliff Pumping Station Inspected.

Dallas, Tex.—The new Oak Cliff pumping station on Lancaster avenue, just at the end of the viaduct, has been inspected by Mayor Holland, Commissioners Nelms, Henderson, Blaylock and Scott; City Engineer Preston Waterworks Engineer Bassett and Building Inspector Emmins. The brick pumping station building, Lindsley & Smith, contractors, has recently been completed, being built on foundations laid by the city, without contract. This method was followed because unusually heavy foundations are needed to hold the massive pumping machinery. Waterworks Engineer Bassett will commence the installation of machinery in the new Oak Cliff station at once, but it may be several months before the equipment is completed and the station actually put to work permanently supplying Oak Cliff with water. The two and a quarter million gallon per day capacity pump is to be moved from Turtle Creek to the new Oak Cliff station, and other machinery installed, all of which will be somewhat slow in being accomplished because of the massiveness of the pumps, etc. The capacity of the new Oak Cliff station can be made several million gallons. The Oak Cliff consumption is about one million gallons per day, and accordingly the new plant will be prepared to meet almost any emergency. This station will supply Oak Cliff exclusively, the supply being artesian water from the city wells in that section. After the inspection of the new Oak Cliff pumping station, the officials drove to Lancaster avenue and Tenth street, inspecting the paving work being done on those thoroughfares. Paving of creosoted wood blocks is being laid, and about half of the work on Lancaster avenue has been completed.

#### Larger Meters Would Reduce Water Loss.

Perth Amboy, N. J.—That the city may be losing hundreds of dollars a month because of the inability of the water department to test meters above the two-inch size, was the substance of a report made by Superintendent A. H. Crowell to the Board of Water Commissioners. He stated that at one plant in the city he believed that \$300 value of used water had not been recorded by the six-inch meter at that place. Mr. Crowell recommended that an apparatus be obtained by which tests may be made of all meters above the two-inch grade. He stated that at present the meters above the two-inch size have to be taken to Jersey City to be tested if it is suspected they are out of order, and that as such expedient is very inconvenient and expensive that parties having such a meter are reluctant to report the deficiency in same because of the tediousness, etc., of having it tested outside of the city.

#### No Hydrant Fountains for Boston.

Boston, Mass.—Using fire hydrants for drinking fountains by the employment of a device originating in Rochester, N. Y., seemed to the mayor an interesting experiment to make during the coming summer, but Division Engineer Frank A. McInnes of the public works department reports against it. The plan in use in Rochester has worked with satisfaction. On one of the hydrant nozzles is attached an extension nipple which has an upright service pipe, equipped with a small valve. A sanitary drinking fountain is connected to this upright service and a small waste pipe is ex-



tended down to the curb. The water is left turned on into the hydrant and the small valve is adjusted so that the proper amount of water is served to the fountain. Mr. McInnes believes that such an attachment on the Boston hydrants would cause delay to the fire department, as it must be removed before the hose can be attached. The main valve must be open in hydrants with the drinking attachment, while the normal condition of the hydrant is to have the main valve closed. If the attachment is placed without independent valves the firemen must first close the valve in order to apply independent gates on the outlets.

#### Want New Water Supply.

Bloomington, Ind.—A number of test wells are being sunk in the Griffy creek district, four miles north of Bloomington, under supervision of the city, in an effort to get an adequate water supply for the city. Four wells have already been driven, which are proving very strong. The city council called in W. G. Moore, of Indianapolis, and he says he is satisfied the supply is a steady vein and not a backed-up reservoir of water. The city owns the local system west of Bloomington, but has had a great deal of trouble in holding the supply on account of the numerous leaks in the reservoirs. The geology department of Indiana University advised the city council to seek a permanent supply where the present wells are being put down.

#### Water Plant Improved.

Van Alstyne, Tex.—The city has just completed the construction of a large concrete reservoir at the pump station and the installation of new pumps, using gas engines for motive power. This gives the city a duplicate pumping system and the construction of the reservoir will give the city storage capacity for water to meet the requirements of the insurance laws, and on account of these improvements has received a reduction of 10c. in the key rate.

The City Council is now contemplating further improvements, in that they expect to erect a brick pump station and city hall and to duplicate the water mains through the mercantile section of the town. When these improvements are completed it will give a further reduction of 22 cents in the key rate, and this will give Van Alstyne one of the lowest key rates of any town of its size in the State.

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## STREET LIGHTING AND POWER

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#### Will Double Plant Capacity.

Fort Worth, Tex.—Because of increased business the capacity of the power house of the Fort Worth Power & Light Company on the Trinity river at Main street will be doubled. A new smokestack, duplicating the present 265-foot stack, will be erected and eight new boilers with a total of 4,000 horsepower will be installed. Diamond Hill and Riverside will get electric light and power service, beginning Sept. 1. The present smokestack is 20 feet in diameter at the base. It cost \$30,000. Additions to the building will be necessary for the installation of the new boilers.

#### City Without Light.

Muskegon, Mich.—The city was without electric light or power for several hours one night last week as the result of a strike of the operators of the Commonwealth Power Company.

#### Cuts Light and Power Bills.

Edmonton, Ala.—Users of electricity for lighting and power purposes will be the first to benefit directly from the municipal ownership of public utilities in Edmonton by a reduction of from 12½ to 25 per cent in rates, effective early in June. A. W. Ormsby, superintendent of the department, which has a surplus of more than \$100,000, has recommended a cut of 12½ per cent. in light rates, now eight cents per k. w. h., and 25 per cent. reduction in power rates, now four cents, with a sliding scale for manufacturing concerns. The commissioners favor the cut. The total profits of all the publicly-owned utilities in Edmonton was \$60,000 last year. The street railway reported a large deficit on account of extraordinary charges and extensions and improvements, but the light and power departments earned more than sufficient to cover the losses. The water department

was operated at a profit. The city charges \$1 for 25 tickets, good at all hours, with universal transfer; labor tickets, good during certain hours in the morning and evening, eight for 25 cents, and student's tickets, good at all hours, twelve for 25 cents. Twelve million passengers were carried in 1912, as against 1,812,490 in 1909. Mayor William Short, who is also chairman of the board of city commissioners, said that reductions will be made in other departments as soon as possible. The street railway showed a slight profit in April, he added, and it is expected that this will be increased with lower power charges. Ten miles of lines will be built and placed in operation during this year.

#### Erect District Lighting Plant.

Colorado Springs, Colo.—The city engineer and electrician have reported favorably on the permit asked by a group of business men to establish an independent lighting plant for the use of firms in one block of Pike's Peak avenue. The matter has now been referred to the commissioner of public works, who will secure detailed information of the plans from the firms interested. Friction with the electric company regarding rates led to the movement, which has progressed to the stage where a permit from the city for placing poles and stringing wires seems likely to be granted.

#### Lighting Plant is Ready.

Sag Harbor, L. I.—Destroyed by fire in March, Sag Harbor's electric lighting plant has been rebuilt and will soon give night and day service. The village has notified the company that the contract regulating street lighting will now be enforced. After the fire, the company sold out to a newly formed corporation.

#### Grand Forks to Own Light Plant.

Grand Forks, N. D.—After a long fight on the question of either improving the municipal light plant or contracting for a supply of the current from a private company, the city council has decided in favor of the municipal plant. The equipment will be improved by the addition of about \$13,000 worth of new machinery, and the plant will be put in first-class condition.

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## FIRE AND POLICE

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#### Want New Ideas in Police Stations.

Wilmington, Del.—Wilmington police commissioners will visit several cities where there are modern police stations to get some ideas to include in their recommendations to the joint building commission for their quarters in the new city hall.

#### Latest Finger Print System for Berkeley.

Berkeley, Cal.—With a view of increasing the identification bureau of the Berkeley police department to utmost efficiency, Chief of Police Vollmer is now planning for the installation of the finger print system evolved by Juan Vucetich, the Buenos Ayres identification expert and South American government attache.

According to Chief Vollmer, Vucetich's system is a revelation in finger print identification, and it is far superior to any system heretofore evolved. "We have been groping in the dark with the system which we have been using," Chief Vollmer said, "The Vucetich system has been in operation since 1901, and it is a surprise that we did not know before of its superior efficacy." According to reports received by Vollmer of the reliability of the Vucetich system, there are more than 3,000,000 individual finger prints on file in the Argentinian city, and through this file it was possible recently to identify the body of a drowned person who had lain in the water for nearly two weeks. When the body was recovered the face was unrecognizable, but the imprint of one finger print enabled the experts to turn to the vast file and establish identity. Vollmer is lavish in his praise of the new system. He said that he hoped it would be adopted by the entire State of California. "It is the system we have been looking for," he said. Vucetich lectured on his system for two hours before the Berkeley police department. Identification experts of Oakland, Alameda and Berkeley were present. The Vucetich system is in vogue in every country with the exception of the United States and England.



## MOTOR VEHICLES

### Crowley Puts on Motor Car.

Crowley, La.—The city has added to its electric light and water department a motor car.

### Police Patrol Auto Arrives.

Richmond, Va.—The new police patrol automobile recently ordered by the city at a cost of \$2,500 for the police department has arrived and will be put into service at once. It is a handsome machine, and was made by Kline, of Richmond. A steel garage has been constructed for the housing of the machine on the vacant lot adjoining the police station. It will seat eight prisoners, besides the chauffeur and two officers. By the use of this machine the public will be relieved of the daily spectacle of prisoners being marched through the streets to and from the jail, and of drunken and disorderly persons picked up in various sections of the city.

### Fire Engine Given Tryout in Ogden.

Ogden, Utah.—For the purpose of demonstrating the latest fire-fighting machine Chief A. B. Canfield of Ogden city has received permission from Mayor H. G. Hayball of Logan to use the new \$10,000 auto fire engine recently purchased by that city. The exhibition will be held in the city hall park, when water will be taken from the fountain basin and by the aid of the engine sent to the roof of the seven-story Reed building. The test will be given to show that water can be taken from a pond or a cistern in case there are no hydrants. The pumping apparatus of the engine is operated by the same engine that propels the machine and is capable of pumping 800 gallons per minute. The machine is equipped with a motor of 105 horsepower. Chief Canfield said that a 10 per cent. reduction in the cost of all fire insurance premiums at Logan will go into effect as soon as the new engine is added to the fire-fighting equipment of the Temple City. Besides the local commissioners there will be on hand to witness the exhibition the mayor of Rawlins, Wyo., and the chief of the fire department, the commissioner of public safety and chief of the fire department of Provo, a delegation from Brigham and the board of underwriters from Salt Lake.

### La France Engine Test.

Johnstown, Pa.—At a recent test of an American La France pumping engine in Johnstown, herewith illustrated, the machine, a six-cylinder combination pumping engine, chemical engine and hose motor car, exceeded the guaranteed capacity of 700 gallons per minute at 120 pounds pump pressure and 350 gallons per minute at 200 pounds pump pressure. The gasoline engine size was 5½ inches bore by 6 inches stroke. The machine carries 1,200 feet of 2½-inch hose, a 40-gallon chemical tank, 200 feet of chemical hose, beside the regular equipment of ladders, axes, crow-bars, etc.



### Auto Fire Truck Will Tow the Steamer.

Raleigh, N. C.—Under a new regulation of the fire department, the auto truck in Fire Station No. 1, near Capitol square, will tow the steamer in all cases where an alarm comes from within the fire district. Chief Brockwell says the speed will not exceed 20 miles an hour, and the truck and steamer will be at any box in that district in 2½ minutes at the outside.

### Reading Acquires Two La France Engines.

Reading, Pa.—Within four months the city will be protected by two of the strongest and most modern auto fire engines to be found anywhere in the United States.

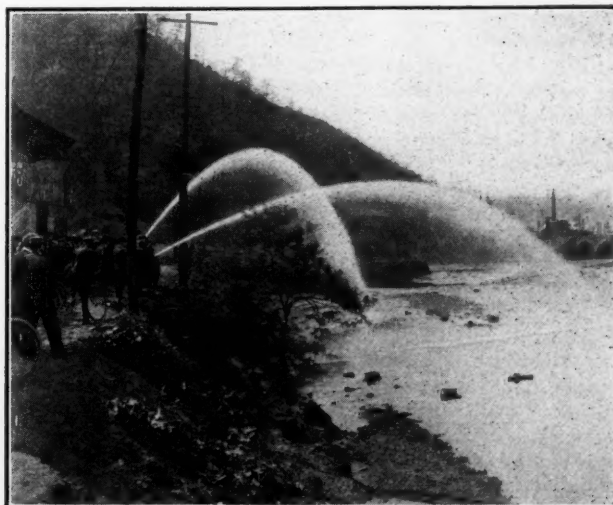
The Liberty and Hampden Fire Companies in February, 1913, appointed two committees to investigate the results of different types of fire fighting apparatus and a decision was reached to purchase two 900-gallon La France engines.

### Auto Fire Engine Test.

Saugus, Mass.—People who witnessed the recent demonstration by the Nott automobile pump engine in Saugus are convinced that the efficiency of the fire department could be greatly increased by the purchase of a similar piece of apparatus. The Nott pump engine was given a severe test in Saugus but lived up to its reputation. The machine dragged water out of the Saugus river, forced it through 400 feet of hose and threw a stream a distance of 250 feet in 20 seconds after the hose was laid and the engine began to throb. The pressure at a 2¼-inch nozzle at the end of the 400 feet of hose reached 167 pounds to the square inch when the machine was working at full speed.

### Preliminary Tryout of Turbine Engine.

Tacoma, Wash.—Fire Chief George McAlevy's new "Bear-cat," technically known as a 144-horsepower gasoline turbine fire pump, made by the Seagrave Company, was again put through its paces informally before test. After the trial runs the big engine was taken to the Municipal dock and set to work. Exactly 1,200 gallons of water a minute were forced through the air from the water's edge reaching nearly half way across the channel. A two-inch nozzle was used when salt water was pumped and Chief McAlevy directed his men to play the stream away from the concrete piers of Lincoln bridge "so's not to take any chances." With the salt water tests finished, the "cat" was hitched to a fire hydrant. It "squirted" a two-inch stream a full city block. A three-inch stream was sent about 175 feet, according to Commissioner Mills' measurements, and a 2½-inch stream went 225 feet. The bulk of the water was not carried as far with the inch nozzle in use as when the one twice as large was screwed on. It required two of the huskiest firemen on the ground with steel braces to hold the nozzle. Already a keen competition has arisen among the fire captains, chauffeurs and hosemen for the honor of serving on the "cat." Only three men will be needed, a captain, hoseman and a driver. The car went through its



AMERICAN-LA FRANCE ENGINE TESTS AT JOHNSTOWN, PA.  
Courtesy Johnstown "Daily Tribune."

paces without a hitch. It made a run for the 9th street hill at 30 miles an hour with the bell clanging as if a real fire was on. An aged expressman with a scrawny white horse got in the way at 9th and C streets, and but for the quick action of the emergency brakes a collision would have resulted. The car came to almost a dead stop and then picked up the grade, which is one of the steepest in the city, on the low gear for 50 feet, then jumped into high gear. Commissioner Mills read the speedometer at 33 miles before D street was reached and the car proceeded as far as Yakima avenue at this gait. On Yakima avenue the accelerator was again pushed down and a speed of 43 miles was maintained for several blocks. Tacoma's turbine pump is the only one north of California on the Pacific coast and there are only a few in that state or in the East. Fire department men from all the prominent cities of the Northwest are expected to see it go through its official test.

#### Auto Hook and Ladder Truck Arrives.

Deal, N. J.—The Deal Fire Department has received its new American-La France fire truck. It is painted white, with red and gold stripes. There are 240 feet of ladders, including the big 55-foot extension. There are also a 35-foot extension, scaling, roof and inside ladders. They are of the truss design, so grouped on the apparatus that they can be taken off with the least effort. Installed about the apparatus are picks, crowbars, shovels, forks, lanterns and other small essential equipment. Chemicals are placed on the running boards. These running boards and foot rests are ample to carry the men. There are a number of special features about the apparatus suggested by Chief Birkenfeld. On top of the ladders additional wire cages have been constructed. The one forward carries 500 feet of chemical hose already attached to a 35-gallon chemical tank. The middle cage is reserved for coats and boots. The rear cage, specially ordered, is large enough to carry 500 feet of reserve hose for the engine. The big apparatus has a speed of 75 miles an hour. It is driven by a 100-horse power engine, six cylinders, water cooled. There will be plenty of illumination, a searchlight being installed that can be revolved at will. The apparatus is 42 feet in length over all, with 242 inches wheel base. The rear tires are of the Dual type, Dayton Airless. The front tires are of single pattern.

#### Test Nott Engine.

Naugatuck, Conn.—Exceptionally fine tests were made by the big auto fire-fighting machine of the Nott Fire Engine Co. of Minneapolis, Minn., at the Woolen Mill Pond in the presence of several hundred people. The average efficiency of the four tests taken was 117 per cent., or better by 17 per cent. than is expected of the machine. The tests were made in the presence of Fire Chief Clark, Warden Cross and the members of the Borough Board. The big motor was driven to the bank of the pond and lines of hose were stretched along the side of the pond and streams of water were thrown to the other side of the pond and high in the air. The first test made was with two lines of hose, each 350 feet long, with 1½-inch nozzles. The pump power was 155 pounds, the vacuum 16 inches, the nozzle pressure 66 and 80 pounds, gallons delivered, 660, the net pump pressure with vacuum, 163 pounds, and the horse power net at the pump, 62.7. Test number two was under the same conditions as number one, with the two lines of hose siamesed into one 1½-inch nozzle, the pump power was 170 pounds, the vacuum 15 inches, the nozzle power 90 pounds, gallons delivered, 633, net pump power with vacuum, 177 pounds, horse power net at the pump, 65.4. Test number three was made with a 1½-inch nozzle, and the pump pressure was 155 pounds, the vacuum 16 inches, the nozzle pressure 74 pounds, gallons delivered, 674, net pump pressure with vacuum, 163 pounds, horse power net at the pump, 63.5. Test number four was made with one line of hose 700 feet long with a nozzle 1½ inches. The pump pressure was 270 pounds, the vacuum 10 inches, the nozzle pressure 88 pounds, gallons delivered, 351, net pump power, 275 pounds, horse power net at the pump, 56.3. The total average horse power net at the pump was 51.8 pounds; the total average horse

power of cylinders, A. L. A. M. rating, 52.8; the total average per cent. of efficiency, 117. The total average pump pressure was 194.5 pounds; the total average gallons delivered, 629½, and the gallons delivered per horse power at the cylinders, A. L. A. M. rating was 11.9. The big machine was run on the steep hills of the borough and no trouble was experienced in climbing Naugatuck's steepest. One road test which was especially pleasing to the company's representatives was when the car was run half way up the steepest part of May street, brought to a stop and started again, and the big machine took the hill without trouble.

## GOVERNMENT AND FINANCE

### Store to Sell City Bonds.

St. Paul, Minn.—An innovation was announced by the Golden Rule, a department store, which has purchased \$100,000 of city improvement bonds and will offer them for sale just as it does dry goods and other merchandise. The store bought the bonds from three banking houses. Samuel Dittenhofer, vice-president of the store company, said the bonds would be advertised. "Our customers," he said, "will be able to obtain these bonds for exactly what they cost us."

### Bond Selling by Department Stores.

Milwaukee, Wis.—The recently established practice of selling municipal bonds in department stores in small amounts, which has been a success in several of the larger cities, may reach Milwaukee. Oscar Greenwald, of Gimbel Brothers, conferred with City Controller Kotecki and William H. Upmeyer, public debt commissioner, and offered the services of Gimbel clerks to aid in the sale of Milwaukee bonds. He offered, in behalf of Gimbel Brothers, to dispose of \$100,000 worth of bonds at any time the city officials decide upon the experiment. In Minneapolis several large issues of municipal bonds were sold over department store counters, reaching the customers who were thus able to invest small amounts with what they considered gilt edge security. New York and other cities have tried the plan, Gimbel Brothers having disposed of \$100,000 worth of bonds in their New York store.

### Denver's Hands Tied.

Denver, Colo.—Municipal business in Denver with its two sets of administration officials has come to a standstill. The old administration continued to deny the legality of the new commissioners, elected May 20, and Deputy Treasurer Charles refused to cash city warrants issued by Auditor Markey. Banks in the city refuse to discount city warrants until the controversy has been settled.

## STREET CLEANING AND REFUSE DISPOSAL.

### Council Chooses Kansas Oil for Streets.

Janesville, Wis.—Kansas asphaltic oil, the product of the Cudahy Refining Company's refinery at Coffeyville, containing from 60 to 65 per cent. of asphalt and offered at the price of 4.94 cents a gallon, will be purchased by the city of Janesville for use in laying the dust and protecting the surface of its macadam streets during the coming season according to the action taken by the council. City Clerk J. P. Hamarlund was directed to enter into a contract with the Cudahy Company for the purchase of from 75,000 to 100,000 gallons of the oil according to the terms proposed. The city proposes to apply the oil to the streets, one-half gallon to the square yard, at a cost of five cents per running foot to the abutting property. To buy an oil at a higher price than that decided upon would put the burden of the expense upon the city. Under the proposed arrangement it will be done for very near actual cost. The Coffeyville oil was used at Madison two years ago with very satisfactory results. City Engineer C. V. Kerch made a report to the council as to a site for an oil storage tank. The best location for one, he said, was on Race street, between Franklin and River streets. Agent Hemming of the Chicago &



Northwestern railway has given him assurances that a siding can be put in at this point, and has made application for one to the proper authorities. The tank would be put about half way up the embankment, making it possible to unload the oil cars into it by gravity, and to tap it into the wagons in the same manner. The next best location, according to the engineer, is on the Baker spur on North Bluff street. It is roughly estimated that it will cost from five to six hundred dollars to buy, ship and erect an oil storage tank with a capacity of 8,000 gallons, the size which the council favors. Quotations on such tanks have already been received, and one will probably be contracted for at an early meeting.

#### Women May Become Street Cleaning Inspectors.

Philadelphia, Pa.—Women as well as men will be eligible for the position of street cleaning inspector in Philadelphia, according to an announcement made by the civil service commission. A competitive examination for inspectors will be held on June 20. The position pays a salary of \$1,300 annually. Chief Connell of the bureau of highways favors the appointment of women, who, he says, are constant disciples of the "cleanup and keep clean" policy, and that their work for a "city beautiful" indicates that they are competent to become street inspectors.

### RAPID TRANSIT

#### New Style Cars for Tacoma.

Tacoma, Wash.—Resplendent in varnish and green paint, ten new street cars for use in Tacoma arrived in the city. Tacoma women will be glad of the designing of the cars, as approved by Manager L. H. Bean of the Tacoma Railway & Power Company. The step is several inches lower than that on the cars now in service, and it will be found that the new cars will be more convenient to enter and leave than the ones now in use. The cars are of the "pay-as-you-enter" type, but "double-ended," which means that they can be driven in either direction. Large vestibules are provided, in one corner of which is the place for the motorman. Doors with glass panes in them block the entrance to the step while the cars are in motion. They have rubber "fenders" on the edges where they meet to prevent a careless passenger from having a finger pinched. Small levers at the conductor's left hand operate the doors. The door on the right-hand side in the front end of the car will be used for alighting only. The motorman will open and close this door, which lowers the step as it is swung back. As it is closed the step is raised up flat against the car. Patent ventilators in both ends provide fresh air all the time, as the air rushes through when the car is in motion. Small dish-like ventilators are in the roof for additional ventilation. One of the features that will attract attention at once as the cars move about the streets is the absence of the row of glass ventilators found on the top of nearly every other car in the city. Seating accommodations for 52 passengers are provided, while the roomy aisles and vestibules give plenty of room for standing. The cars are 47 feet 5 inches long and were made by the Cincinnati Car Company.

### MISCELLANEOUS

#### Collapse of Municipal Pier.

Long Beach, Cal.—Thirty-six dead and many others seriously injured, several of them so badly that they may die, is the toll of the disaster which occurred Saturday, May 24, when part of the municipal pier collapsed just after the close of the British "Empire Day" pageant. When the land end of the big double-decked pier gave way, hundreds of persons on the top deck were plunged down on the heads of other hundreds crowded on the main floor. The lower deck in turn gave way and all were dropped down a chute of broken timbers to the sands, twenty-five feet below. The tide was out when the crash occurred, else the collapse would have thrown hundreds of persons into the sea and many drownings would have been added to the list of fatalities. The tremendous strain followed the rhythmic vibration created by the measured tread of thou-

sands of feet, fully as much as the actual weight of the crowd, was responsible for the fall of the structure, in the opinion of military men. The usual deterioration of the strength of the pier, which was built eight years ago and never repaired, was believed to have been brought about by the action of salt air on the wood and iron fasteners and supports. Prospective damage suits, aggregating probably \$1,000,000 or more, and a grand jury investigation have engaged the attention of city officials as the first aftermath of the accident. The grand jury investigation was demanded by the officers of the United Societies of British-Born Residents and Visitors, whose celebration of Queen Victoria's birthday anniversary was interrupted by the accident. City Attorney Long answered reports of the prospective damage suits with the statement that in his opinion the city could not be held responsible for the deaths and injuries, because no charge had been made by the city for the use of the municipal amusement property. Use of the pier and auditorium had been given without cost, and the celebrators had used it at their own risk.

#### Aberdeen May Get New Dance Ordinance.

Aberdeen, S. D.—The city commissioners of Aberdeen are taking under advisement a new dance ordinance prepared by the W. C. T. U. of this city and endorsed by the Aberdeen ministerial association. The ordinance provides a license of \$1 per night to be taken out by owner's or lessee's of dance halls for every night on which dances are given of a public character or where admission is charged. It also provides that no unmarried minor under the age of 18 years shall be permitted to remain in the hall unless under the escort of his or her parent or guardian.

#### Municipal Ice Plants Suggested.

New York, N. Y.—The experimental manufacture on a small scale of ice by the city for the benefit of poor families, brought before the Board of Estimate by President McAneny of Manhattan, was laid over for consideration. Two propositions were made to the board. First, that the committee on the study of the Department of Health, Charities and Hospitals, of which Mr. McAneny is chairman, be empowered to look into the matter with a view to establishing a city plant in 1914. Second, that some of the power plants that the city now operates at some of its public buildings be utilized to manufacture ice on an experimental basis for use this summer. The Hall of Records power plant in Manhattan, which is already equipped with a refrigerating system, could at slight expense be utilized for this purpose and turn out 25 tons of ice a day, he declared—enough to supply 2,000 families. At an added expense of \$25,000 it could be made to manufacture 50 tons a day. Mr. McAneny submitted a report to the members of the board for their consideration. In it he said in part: "I have asked and received from the borough engineers a report on the practicability of establishing a city ice plant. I am informed that plants could be established at a capital outlay of \$1,000 to \$1,500 per ton of daily capacity, and that the cost of production, including capital investment, but exclusive of delivery charges, would not exceed \$1 per ton. The current commercial price of ice, delivered, is from 40 to 45 cents a hundred pounds, or \$8 to \$9 a ton. In the hottest months of the summer, if the experience of the past is a guide, the price will be still higher. The cost of transportation of city-manufactured ice in bulk to the milk stations, it is calculated, would not exceed \$1.50 a ton. The engineers report also that it would not be practicable to build and equip adequate plants for use during the coming summer. They recommend, however: (1) That a careful study of the entire matter be made under the direction of your committee and in consultation with the Department of Health, with a view toward establishing plants for use during the summer of 1914. (2) That the presidents of the boroughs and the Commissioner of Health be authorized, during the coming summer, to provide for the manufacture of ice, upon an experimental basis, through the use of the power plants of the public building, and for the sale at cost of the ice so produced at the fifty-five milk stations the city now maintains.



### North Yakima Buys Site for City Park.

North Yakima, Wash.—The purchase of a triangle at the head of Yakima avenue, in the heart of the choicest residence district of the city, for a city park, has been authorized by the City Commissioners. While the price paid was \$4,500, the expenditure represents \$7,283, as the city assumes large paving assessments on the property. A few years ago a Spokane man purchased the site and announced that he would put up a large apartment house with stores on the ground floor. The park agitation has been strong ever since. The purchase gives North Yakima an admirably located recreation park and sites for two playgrounds.

### Favors River Parks.

Terre Haute, Ind.—George E. Kessler, the landscape architect, told the Park Commissioners of the city, and other civic bodies, that the city ought to buy the lands on both sides of the Wabash river, as well as Taylorville. It had been practically decided to buy Taylorville for a park. Mr. Kessler said the river banks should be changed from the most unsightly to the most beautiful parts of the city, and that factories should be moved from the banks. The Park Commissioners will ask for a written report from Mr. Kessler.

### Establishment of City Market Urged.

Tucson, Ariz.—Agitation for a city market is being made in Tucson in order to eliminate the middleman and provide the farmers of the locality with a ready means of disposing of their crops. It is proposed to have the city erect a huge shed and stalls for the farmers, charging a reasonable rental until the city is reimbursed. Farmers have in past years been much discouraged here by the difficulty which they have experienced in selling their product. With the great tracts of the Tucson Farms Company fast coming into cultivation, it is regarded as inevitable that some means of helping these farmers dispose of their crops must be given consideration, and the city market is considered the most feasible proposition yet advanced.

### Plan Municipal Saloon.

Petoskey, Mich.—Petoskey residents are watching with considerable interest the working out of an idea to start a municipal saloon at Harbor Springs. Petoskey and Harbor Springs are both in Emmet County, which just went "wet" after four years of local license. Petoskey individually went "wet" and Harbor Springs individually went "dry" in the recent election. The Socialists are in control at the Harbor, having twice elected a mayor, and there is strong talk of the city operating a retail liquor store.

### Municipal Machine Shop Completed.

Los Angeles, Calif.—City Purchasing Agent Arthur L. Baker and the members of the supply committee of the council are making preparations for a public reception at the city's new store house and machine shops, Pasadena avenue and Avenue Nineteen. At that time the building that is destined to save the city many thousands of dollars annually, will be for the first time thrown open to the public. This plant is organized on a system that has been praised by the National Municipal League. Within a few months buying in small quantities at high prices to meet immediate demands will be entirely done away with. The plans for this one and two-story brick structure, in the form of an L, were drawn by Superintendent of Buildings Backus and the construction has cost the city \$30,000. Combined in this structure are storeroom, office, machine shop, blacksmith shop, garage and oil storage room. The engine house, drill tower, paint shop and the new brick structure occupy only a part of the fine site owned by the city. In the machine shop the city's \$100,000 worth of motor propelled fire fighting apparatus, thirty automobiles and many of its thirty motorcycles will be overhauled and repaired. The garage will hold twice as many automobiles as the city now owns. In the store wing is the office, where the cost accounting is done. Supplies are retailed to the various departments—by requisition—for actual cost, plus 5 per cent. for administration. The charge for administration when repairs are

made will be 15 per cent. Labor and materials will be charged at cost. Mr. Baker hopes to reduce the administration charge later on. "The city will save 20 per cent. on repair bills," said Mr. Baker. "The store department will sell \$100,000 worth of supplies next year. We have a working capital of \$19,000, and we are asking for \$20,000 more."

### Wars on Long Hatpins.

Vienna, Austria.—Since milder measures have proved ineffectual against the dangerously long, unprotected hatpin, the Austrian imperial and local authorities have decided to take more vigorous action. The Ministry of Railways has issued an order that women wearing such unprotected hatpins shall not be permitted to ride on the Austrian state railways until they have removed the perilous pin. The management of the Vienna municipal tramways has gone even further in directing tram-car conductors to compel such offenders to leave the car immediately. If they refuse, the conductors will have the police remove them by force.

### Mayor Drives Last City Horse Car.

San Francisco, Cal.—Mayor Ralph drove the last horse car in San Francisco on its final trip on June 3 from the ferry building to the scrap heap. With a driver's cap on his head the mayor took the reins from J. H. Lee, who for twenty-six years had driven the same car on the same run. The car had been in use thirty-two years.

### Smoke Law for Hartford.

Hartford, Conn.—A bill just passed by the State Senate makes Hartford the first city in the state of Connecticut to have the power to regulate the smoke nuisance by local ordinance, a power which has been sought for twenty years, but which the representatives of the New Haven road have always successfully opposed because of the fear that the engines of the railroad would be forced to stop smoking in Hartford. In fact, this is one of the principal purposes of the legislation, for the state capital, state arsenal and the new state library and Supreme Court building are fast being blackened by soft coal smoke from the railroad engines. The bill in question gives the Common Council of the city of Hartford the right to make ordinances regulating the production or emission of smoke from any chimney, smokestack or other source within the city limits. Mount Vernon, N. Y., and Springfield, Mass., are the nearest cities having this power, and before the use of electric engines the former several times made trouble for the New Haven road.

### City to Pay Expense.

Long Beach, Calif.—All expenses of the funerals of the 37 persons killed in the municipal pier disaster and that incurred in the care of the injured probably will be borne by the city of Long Beach out of a fund to be raised by special tax levy. The city council has instructed the city attorney to prepare an ordinance calling for an election on this proposed tax. The citizens relief committee will provide the council with an estimate of the amount required. It is expected to reach about \$30,000. City officials assert that voluntary relief work by the municipality is not admission of the city's liability for damages. In addition \$2,500 for relief was appropriated by the council.

### Municipal Athletic Society Is Planned.

Portland, Ore.—Plans for a great outdoor recreation organization, to be known as the Municipal Athletic Association, and with which all local athletic, walking and recreation societies in the city will be affiliated have been formulated by Park Superintendent Mische, to be presented to the City Park Board in the near future for consideration. With such a central organization, he says that he believes the greatest good and pleasure may be obtained for the reason that athletic events, hikes, picnics, excursions and aquatics may be conducted in a systematic manner and under proper supervision. He would have the chairman of the Park Board president of the organization and vice-presidents would be chosen from the various organizations affiliated with the municipal association. He would have an executive board of eight or ten members and an advisory board of one hundred or more whose duty it would be to conduct all outings and athletic contests.

## LEGAL NEWS

### A Summary and Notes of Recent Decisions— Rulings of Interest to Municipalities

#### Claims—Allowance—Review.

*Wahl v. Board of Water Commissioners of Atlantic City et al.*—A false bill was rendered to the water commissioners of Atlantic City containing items for cost of assistant engineer when none was employed, and the bill was not verified as required by statute. Held, on certiorari, that an approval of the bill by the water commissioners would be set aside.—Supreme Court of New Jersey, 85 A. R. 1024.

#### Municipal Water Supply—City Purpose.

*Water Supply Co. of Albuquerque v. City of Albuquerque.*—The establishment and maintenance of a fountain at the intersection of two principal and much traveled streets, for quenching the thirst of animals using the streets, is a "city purpose," and a water company, under a contract with the city which requires it to furnish water to the extent of 12,000,000 gallons every six months free of charge for city purposes, cannot collect from said city for water supplied to such fountain.—Supreme Court of New Mexico, 128 P. R., 77.

#### Water Company—Rates to Be Charged.

*State ex rel. St. Joseph Water Co. v. Geiger, et al.*—A municipal water company extended its mains to furnish water to a patron outside of the city limits, entering into a contract with such patron for the furnishing of water at a higher rate than that allowed by municipal ordinance. The ordinance provided that mains in the municipality should be equipped with hydrants at fixed intervals, for which the city was to pay the water company an annual rental, but the extension main was not equipped with such hydrants. Held, that upon the extension of the city limits to include the outside customer the water company could not, on the theory that the main was a private one, demand a higher rate of compensation than that fixed by ordinance; the right of the customer to be supplied with water at the fixed rate not requiring the installing of a new main.—Supreme Court of Missouri, 154 S. W. R. 486.

#### Public Water Supply—Uniformity of Charges.

*City of Montgomery v. Greene et al.*—A municipality, authorized to supply water, may not discriminate as to the rates charged, at least among those of the same class, but all persons are entitled to have the same service on equal terms and uniform rates; and, where a city exercises its option to extend its mains beyond its municipal limits, it may not discriminate in favor of those who reside within the city limits, and who are liable for water taxes, since the supplying of water and the rates charged is not the exacting of a duty or tax, but the mere furnishing of a public necessity, which must be supplied to all consumers alike. Municipalities supplying their inhabitants with water do not do so in the exercise of the power of local sovereignty, but in the capacity of private corporations, and stand upon the same footing in this respect as do private corporations.—Supreme Court of Alabama, 60 S. R. 900.

#### Franchise to Water Company—Municipal Competition.

*Town of Glenwood Springs v. Glenwood Light & Water Co.*—The exclusion of the grantor in a municipal or quasi municipal grant or contract from the right to compete with the grantee does not inhere in the grant or contract unless such exclusion is clearly stipulated therein, or is necessarily implied therefrom. A town granted to a water company the right to construct and operate waterworks for a term of years to supply the town and its inhabitants with water for fire, domestic, and other purposes, the right to lay and maintain its pipes in the streets and alleys of the town for this purpose, and the exclusive right to furnish the town with water for public purposes, such as the extinguishment of fires, the flushing of sewers and the sprinkling of the

streets, and the town agreed to pay stipulated prices for the water for public purposes, to protect the company in its use of the streets, in the construction and use of its waterworks and in the collection of its water rates. The water company accepted this grant, executed the contract, and constructed and operated its waterworks. Held, the grant and contract did not exclude the town from the right to construct and operate waterworks to supply its inhabitants with water for domestic and other purposes in competition with the company, and an injunction restraining it from so doing could not be sustained.—United States Circuit Court of Appeals, 202 F. R. 678.

#### Regulation of Water Rates—Commissioner.

*City of Pocatello v. Murray.*—The fact that commissioners appointed by a person, company or corporation supplying water to towns and cities under the provisions of a section, Rev. Codes, have been, and are, employees of the person, company, or corporation, and that one of such commissioners was the general manager of the city and such person, company, or corporation, and as such manager contested and opposed the fixing of the rate to be charged for the use of water furnished by the person, company or corporation in previous negotiations between the city and such person, company, or corporation in order to agree upon a rate, does not necessarily disqualify such persons from acting as commissioners if appointed under the provisions of such section.—Supreme Court of Idaho, 130 P. R. 383.

#### Payment of Workmen—Waterworks Engineer.

*Robinson v. City of Perry.*—The proviso contained in section 4057, Comp. Laws 1909, is an "emergency" measure; and it is not contemplated thereby that a man employed by a city as an engineer at its waterworks plant should recover for extra time over eight hours provided for therein, where the same is devoted by him to performance of his ordinary and usual duties.—Supreme Court of Oklahoma, 130 P. R. 276.

#### Water Bonds—Ratification of Indebtedness.

*City of Santa Cruz v. Wykes et al.*—Const. Cal. prohibits cities from incurring indebtedness exceeding in excess the revenue of any year without the assent of two-thirds of the qualified voters voting at an election, etc. By Act March 19, 1889, it was provided that a two-thirds vote should be required, and the debt limit fixed at 5 per cent. of the assessed value of the city's real and personal property. By Act March 11, 1891, the limit was raised from 5 to 15 per cent. Held, that where a city having assumed certain water bonds as a part of the purchase price of the works which at the time of the assumption exceeded the city's debt limit, but after the city acquired authority to incur the indebtedness by raising the limit to 15 per cent., it passed an ordinance submitting the question of whether such bonds and other city indebtedness should be refunded to the voters, and authority to refund was granted by an almost unanimous majority, such vote operated as a ratification of the indebtedness and validated the bonds.—United States Circuit Court of Appeals, 202 F. R. 356.

#### Water and Sewer System—Bonds.

*Lanigan v. Town of Gallup et al.*—Where the board of trustees of a town, proceeding under sections 12 and 13 of article 9 of the Constitution, held an election to determine the question as to the issuance of bonds for the construction of a system of water works and sewers, and did not follow the procedure required by subsection 67, § 2402, Comp. Laws 1897, the bonds authorized at such election are invalid. The 12-mill levy limitation fixed by section 12 of article 9 does not apply to debts contracted for the purchase or construction of a system for supplying water, or for a sewer system, for cities, towns, or villages. Cities, towns and villages are not authorized to submit to the votes of such municipality the joint proposition of issuing bonds for the double purpose of constructing a water works system and building a system of sewers, without providing for a separate vote upon each question.—Supreme Court of New Mexico, 131 P. R., 997.



## NEWS OF THE SOCIETIES

### Calendar of Meetings.

June 9-13.

INTERNATIONAL ASSOCIATION OF CHIEFS OF POLICE.—Twentieth Annual Convention, Raleigh Hotel, Washington, D. C. Major Richard Sylvester, Superintendent of Police, Washington, D. C., President.

June 24-26.

SOCIETY FOR THE PROMOTION OF ENGINEERING EDUCATION.—Annual Meeting, Minneapolis, Minn. H. H. Norris, Secretary, Cornell University, Ithaca, N. Y.

June 23-27.

AMERICAN WATER WORKS ASSOCIATION. Thirty-third Annual Meeting, Minneapolis, Minn. John M. Diven, Secretary, 47 State street, Troy, N. Y.

June 23-28.

INTERNATIONAL ROADS CONGRESS.—Third Congress, London, England. W. Rees, Jeffreys Secretary, Queen Anne's Chambers, Broadway, Westminster, London, S. W.

June 24-26.

UNION OF TEXAS CHIEFS OF POLICE AND CITY MARSHALLS.—Annual Convention Galveston, Tex.—Hollis Baum, Chief of Police, Waco, President.

June 24-26.

SOUTH CAROLINA STATE FIREMEN'S ASSOCIATION.—Annual Convention, Abbeville. Chief Elgin, Abbeville, S. C.

June 24-28.

AMERICAN SOCIETY FOR TESTING MATERIALS.—Annual Convention, Atlantic City, N. J. Edgar Marburg, Secretary, University of Pennsylvania, Philadelphia, Pa.

June 27-29.

LOUISIANA STATE FIREMEN'S ASSOCIATION.—Eight Annual Convention, Opelousas.

July 8-10.

INDIANA LEAGUE OF MUNICIPALITIES.—Annual Convention, Gary. A. P. Melton, Secretary, Gary.

July 15-17.

UNION OF CANADIAN MUNICIPALITIES.—Thirteenth Annual Convention, Saskatoon, Sask. W. D. Lighthall, Hon. Secretary-Treasurer, 305 Quebec Bank Bldg., Montreal, Canada.

July 21-26.

IOWA STATE FIREMEN'S ASSOCIATION.—Annual Convention, Perry.

July 22-25.

LEAGUE OF WISCONSIN MUNICIPALITIES. Annual Convention, Neenah, Wis.

August 5-8.

NEW YORK STATE FIREMEN'S ASSOCIATION.—Annual Convention, Brockton.

August 19-22.

INTERNATIONAL ASSOCIATION OF MUNICIPAL ELECTRICIANS.—Eighteenth Annual Convention, Watertown, N. Y.

August 25-30.

FOURTH INTERNATIONAL CONGRESS ON SCHOOL HYGIENE, Buffalo, N. Y. Dr. Thomas A. Storry, Secretary General, College of the City of New York.

August 26-28.

CENTRAL STATES WATER WORKS ASSOCIATION.—Seventeenth Annual Meeting, Cedar Point, O.—R. P. Bricker, Secretary, Shelby, O.

September 1-6.

INTERNATIONAL ASSOCIATION OF FIRE ENGINEERS. Forty-first Annual Convention, Grand Central Palace, New York City. James McFall, Secretary, Roanoke, Va.

September 9-13.

AMERICAN PUBLIC HEALTH ASSOCIATION.—Annual Convention, Colorado Springs, Col.—S. M. Gunn, secretary, 755 Boylston street, Boston, Mass.

September 29-October 4.

AMERICAN HIGHWAY ASSOCIATION.—Annual Convention, Detroit, Mich. J. E. Pennybaker, Secretary, Washington, D. C.

October 7-10.

AMERICAN SOCIETY OF MUNICIPAL IMPROVEMENTS.—Twentieth Annual Meeting, Wilmington, Del.—A. Prescott Folwell, Secretary, 50 Union Square, New York City.

November 10-15.

UNITED STATES GOOD ROADS ASSOCIATION.—Meeting St. Louis, Mo. John H. Bankhead, president; J. A. Rountree, secretary, 1021 Brown-Marx Building, Birmingham, Ala.

December 9-12.

AMERICAN ROAD BUILDERS' ASSOCIATION.—Annual Convention, First Regiment Armory, Philadelphia, Pa. E. L. Powers, Secretary, 150 Nassau street, New York City.

### American Water Works Association.

The program for the thirty-third annual convention to be held in the West Hotel, Minneapolis, Minn., June 23-27 has been announced as follows:

TUESDAY, JUNE 24, 1913.

FORENOON SESSION.—Nine o'clock. Regular Order of Business: Calling Roll, Reading of Minutes, Election of Members. President's Address. Reports: Executive Committee, Secretary-Treasurer, Finance Committee, Publication Committee. Reports of Special and Standing Committees: Committee on Electrolysis, Fire Protection Committee, Revision of Standard Specifications for Cast Iron Pipe and Specials, Standard Specifications for Wrought Iron Pipe, Uniform Annual Reports and Accounts, Special Committee on National Bureau or Department of Health, Permanent Headquarters, Incorporation of Association, Revision of Constitution, Standard Specifications for Hydrants and Valves, Water Consumption, Tabulation of Rates and other information.

AFTERNOON SESSION.—Continuation of Committee Reports. Reading of Papers: Power for Pumping Derived from Refuse, E. H. Foster; Water Works Special Franchises, Henry deForest Baldwin; Rates and Rate Making, Halford Erickson.

EVENING SESSION.—Eight o'clock. Masonry Dams. A lecture, illustrated with lantern slides; Edward Wegman.

Prof. Daniel W. Mead, of the University of Wisconsin, and Prof. O. L. Waller, Professor of Hydraulics and Irrigation of State College of Washington, will address the convention on the subject of Hydraulic Engineering Education; followed by a general discussion on Hydraulic Engineering Education and particularly on what the practicing engineer desires the engineering college graduate to possess in the way of general knowledge, technical training and manual skill when he enters his employ, by members of the Society for the Promotion of Engineering Education and the American Water Works Association.

Note.—The Society for the Promotion of Engineering Education hold their convention in Minneapolis at the same time as our convention, and will join us at this session.

WEDNESDAY, JUNE 25, 1913.

FORENOON SESSION.—Nine o'clock. Reading of Papers: Mobile Water Supply, Edgar B. Kay; Gravity Water Supply at the City of Manila, P. I.; H. E. Keeler; Utility and Attractiveness in Economic Reservoir Designs, Alexander Potter. Eleven o'clock. Election of officers and selection of place for holding the 1914 convention.

AFTERNOON SESSION.—Two o'clock. Trip to Minnetonka.

THURSDAY, JUNE 26, 1913.

FORENOON SESSION.—Nine o'clock. Reading of Papers: Charges for Public Water Service to Private Fire Protection Systems; W. E. Miller; Metering Private Fire Services at Kenosha, Wisconsin, August Baltzer; A Reasonable Basis for the Determination of Charges for Private Fire Protection, Leonard Metcalf; How a Private Fire Service Polluted a Public Water Supply and Some of the Consequences, Robert J. Thomas.

AFTERNOON SESSION.—Two o'clock. Reading of Papers: Reforestation and General Care of Water Sheds, Ermon M. Peck; Results of Water Waste Work in New York City, I. M. deVarona; Basic Principles of Ground Water Collection, Charles B. Burdick; The Use of Liquid Chlorine for Sterilizing Water, John A. Keimle; Papers not on the program; Experience Meeting; Question Box.

EVENING SESSION.—Eight o'clock. Reading of Papers: Filters for the Toronto Water Supply (illustrated by lantern slides), Francis F. Longley; The Minneapolis Filter Plant, with a Brief History of the Events which Led Up to Its Construction, W. N. Jones (illustrated by lantern slides); Water Movement Compared with Air Movement and Its Relation to Lake Contamination, J. Walter Ackerman (illustrated by lantern slides).

FRIDAY, JUNE 27, 1913.

FORENOON SESSION.—Nine o'clock. Reading of Papers: Support and Aid to Health Officers, H. F. Dunham; The Bacteria Count on Gelatin and Agar Media and its Value in Controlling the Operation of Water Purification Plants, James M. Caird; Some Notes on the Use of Alum in Connection with Slow Sand Filtration at Washington, D. C., William F. Wells; Modern Filter Practice, Nicholas S. Hill, Jr.; What is Pure and Wholesome Water? George A. Johnson; Effect of Microorganisms on Mechanical Filters, Frederick H. Stover.

AFTERNOON SESSION.—Two o'clock. Trip to Minneapolis Filter Plant.

EVENING SESSION.—Eight o'clock. Unfinished Business; Experience Meeting and informal talk and discussion on water works subjects.

### ENTERTAINMENT.

MONDAY, JUNE 23, 1913.—Eight o'clock evening. Reception at the West Hotel by the Mayor, members of the Common Council and city officials of Minneapolis. Light refreshments will be served during the evening. (Dress clothes optional at this reception.)

TUESDAY, JUNE 24, 1913.—Two o'clock, afternoon. On invitation of the city of Minneapolis the ladies will take automobiles at the Fifth street entrance of West Hotel for a trip through the parks and along the boulevards, visiting Minnehaha Falls and the local lakes.

WEDNESDAY, JUNE 25, 1913. Two o'clock, afternoon. On invitation of the Water Works Manufacturers Association the members and guests will take special trolley cars on Sixth street, one block from West Hotel. Tickets for this trip will be supplied by the Secretary of the Water Works Manufacturers Association. Luncheon will be served during the trip. Return from Lake Minnetonka 7 o'clock, in time for theatres. Tickets and further notice will be given at Secretary's office.

THURSDAY, JUNE 26, 1913. For the Ladies. Ten o'clock, forenoon. On invitation of the city of Minneapolis the ladies will be taken on an inspection tour through one of the large Minneapolis flour mills. Full details of this trip will be announced at the convention. Eight o'clock, evening. The ladies are invited by the Water Works Manufacturers Association to a card party at the West Hotel.

FRIDAY, JUNE 27, 1913.—Two o'clock afternoon. The city of Minneapolis will take the delegates and their ladies and guests, by automobile, to the filter plant. The return to the hotel will be in ample time for dinner and the evening session of the Association.

### National Electric Light Association.

The thirty-sixth convention of the National Electric Light Association was held at Chicago, June 2-6. Of all the national societies concerned with municipal matters this one holds the largest conventions in point of number of delegates and in the number of papers and reports presented. However, many of the subjects are purely trade matters and only concern those cities operating municipal lighting plants, of which there are not a few. Some of the subjects, like the report of the committee on public policy interest all cities. This committee reported that the "natural and proper tendency of the industry is towards a regulated monopoly." The report of the committee on resuscitation from electric shock dealt with a matter of general concern as relative to the duty of all cities to protect life.

Under the general division of generators and transformation there were papers and reports on prime movers, electrical apparatus, switchboard instruments, the design of transformers. One statement made by manufacturers should be noted, namely that for station auxiliaries steam turbines bid fair to replace all other apparatus.

Sub-divisions of the subject, transmission and distribution, were: Direct current transmission, overhead line construction, high tension underground cables, lightning arresters, suspension insulator design, grounding of secondaries, poles and pole preservation, circuit breakers and lightning arresters, receiving apparatus.

Lamps and illumination afforded a variety of subjects for papers and reports. The committee on street lighting recommended a procedure in drafting street-lighting contracts, assuming that a decision had been reached as to the type of illuminant to be used.



Under the division of Soliciting and Utilizing, electric vehicles were discussed by E. E. Witherby of the General Vehicle Company. The high price of gasoline of course tends to increase the value of electric vehicles for general city work. Central station ice making was another topic on this subject, which is of increasing municipal interest.

The division, Relations with the Public, brought out papers on finance and conservation of resources.

The Accounting Methods division developed the fact notable everywhere else where accounting is discussed that uniformity is considered as extremely desirable.

Meters and Measurements were discussed among others by a member of a public service commission.

Among the exhibitors the following companies showed equipment of special interest in the municipal field:

Adams-Bagnall Electric Company, Cleveland, Ohio.—Series alternating-current flame-arc lamps and transformers, incandescent lamps and reflectors, electric horns.

Cooper Hewitt Electric Company, New York, N. Y.—Mercury-vapor and quartz-tube lamps, and battery-charging rectifier.

Edison Storage Battery Company, Orange, N. J.—Nickel-iron storage batteries, plates, parts, etc.

Electric Storage Battery Company, Philadelphia, Pa.—Storage batteries, plates and parts; factory illustrations and publications.

General Electric Company, Schenectady, N. Y.—Multirecorder; incandescent, luminous and flame-arc lamps, ozonators, lightning arresters, electric ovens and ranges, instruments, small motors, regulators, relays, transformers, reflectors and shades.

General Vehicle Company, Long Island City.—Electric truck chassis.

H. W. Johns-Manville Company, New York, N. Y.—Electric-driven refrigerating machines, thermal and electrical insulations, fuses, conduit boxes and fittings, lamps and reflectors.

Life-Saving Devices Company, Chicago, Ill.—Resuscitation apparatus.

Sangamo Electric Company, Springfield, Ill.—Instruments and meters, circuit-breakers and distant-operating dial mechanism.

#### **Illuminating Engineering Society.**

At a meeting of the Convention Committee of the Illuminating Engineering Society held in Pittsburgh, Friday, May 16th, it was decided to hold the next annual convention in that city during the week beginning September 22nd.

The Convention Committee consists of C. A. Littlefield, New York Edison Company, Chairman; P. S. Millar, Electrical Testing Laboratories, President of the Society; H. S. Evans, Macbeth Evans Glass Company, Pittsburgh, Pa.; W. A. Donkin, Contract Manager, Duquesne Light Company, Pittsburgh, Pa.; W. MacFarlan Moore, General Electric Company, Harrison,

N. J.; M. C. Rypinski, Westinghouse Electric & Mfg. Company, New York, N. Y.; C. J. Mundo, General Electric Company, Pittsburgh, Pa.; J. C. McQuiston, Westinghouse Electric & Mfg. Company, Pittsburgh, Pa.; W. J. Serrill, United Gas Improvement Company, Philadelphia, Pa.; S. B. Stewart, Philadelphia Company, Pittsburgh, Pa.; T. J. Pace, Westinghouse Electric & Mfg. Company, Pittsburgh, Pa., and Prof. H. S. Hower, Carnegie Technical School, Chairman of the Local Section of the Society.

W. A. Donkin, of the Duquesne Light Company, was selected as chairman of the Local Committee on Arrangements which will have charge of the convention. J. C. McQuinton, of the Westinghouse Electric & Mfg. Company, was appointed Chairman of the Publicity Committee, and will make all arrangements for advertising the convention.

It is expected that several hundred engineers from all parts of the country interested in lighting will be present.

#### **American Road Builders' Association.**

At a meeting of the Board of Directors of the American Road Builders' Association, held in New York City last week, it was decided to accept the invitation of the City of Philadelphia to hold its next annual convention in that city, December 9 to 12. The sessions of the convention will be held in the First Regiment Armory. This decision was reached after having carefully considered the facilities offered by a number of other leading cities, including Chicago, St. Louis, Kansas City, Detroit, Milwaukee, Washington, etc. Plans for making this convention the largest and most important gathering of road builders ever held in the United States are being carefully laid by the officials of the Association. As usual, the Association will hold an exhibition, or rather exposition, of road and paving machinery, materials, etc. The main floor of the Armory will be utilized for this purpose. Altogether, this building will afford ideal facilities for the exhibition.

#### **Society for the Promotion of Engineering Education.**

W. & L. E. Gurley, of Troy, N. Y., will have a representative exhibit of the instruments which they manufacture at the annual meeting of the Society for the Promotion of Engineering Education, which will be held in the Engineering Building of the University of Minnesota, Minneapolis, Minn., during the week beginning June 23. The exhibit will include engineers' and surveyors' field instruments, water stage registers and current meters, physical and electrical laboratory apparatus, standard weights and measures, accurate mercurial thermometers.

Engineers and others interested will find that a visit to this exhibit will repay them, as an opportunity will be given to inspect the latest improvements in the instruments and to talk with the firm's representatives.

## **PERSONALS**

Goodrich, E. P., New York City, consulting engineer, has been retained by the City Planning Committee of the Chamber of Commerce and Board of Trade, Erie, Pa., to investigate Erie street car conditions.

Grover, Nathan C., of New Jersey, has been appointed chief hydraulic engineer of the water resources branch of the Government Geological Survey by Secretary of the Interior Lane. He succeeds Marshall O. Leighton, resigned. Grover was a former engineer in the Geological Survey and from 1905 to 1907 served as engineer, district engineer and assistant chief hydrographer in general charge of stream gauging work in the United States.

Hibbard, Wm. W., Rochester, N. Y., has been appointed a member of the park commission.

Howard, Col. James W., New York, has been engaged by Mayor Haussling, Newark, N. J., as the mayor's personal representative to act with the engineers in the paving of Broad street with wood block.

Kimball, J. H., has become associated with the firm of Stonestreet & Ford of Louisville, Ky., for the practice of a general engineering business giving particular attention to matters relating to water supply, sewerage and sewage disposal. Mr. Kimball, for the past five years, has been the designing engineer of the Commissioners of Sewerage of Louisville. He is a graduate of the Massachusetts Institute of Technology and has had an experience in municipal and sanitary engineering covering a period of twenty years.

Rouse, Harrison, Weatherly, Pa., has been elected Street Commissioner in place of Albert Romig, resigned.

The following mayors have been recently elected in Illinois:

Kankakee—Mayor, David Lavery.

Mount Vernon—Mayor, Mr. Foster.

Chester—Mayor, Dr. A. E. Fritz.

Cartersville—Mayor, E. L. Robertson.

Carlinville—Mayor, Dr. R. A. Hawkins.

Pulaski—Mayor, J. R. Sneed.

Bridgeport—Mayor, Dr. J. F. Schrader.

Pontiac—Mayor, J. M. Lyon.

Shelbyville—Mayor, D. A. Milligan.

Kinmundy—Mayor, E. G. Mendell.

McLeansboro—Mayor, A. E. Wilson.

Carrollton—Mayor, George H. Price.

Rock Falls—Mayor, A. C. Stanley.

Joliet—Mayor, Harvey Wood.

Carmi—Mayor, John C. Stokes.

Sterling—Mayor, A. J. Platt.

Rockford—Mayor, W. W. Bennett.

Bluffs—Mayor, Dr. H. H. Fletcher.

Staunton—Mayor, R. H. Tate.

Sparta—Mayor, Dr. John R. Lyle.

Eldorado—Mayor, Dr. S. W. Latham.

Johnston City—Mayor, George Fodson.

Morrisonville—Mayor, John F. Glickener.

Winona—Mayor, Edwin Gantz.

Danville—Mayor, W. C. Lewman.

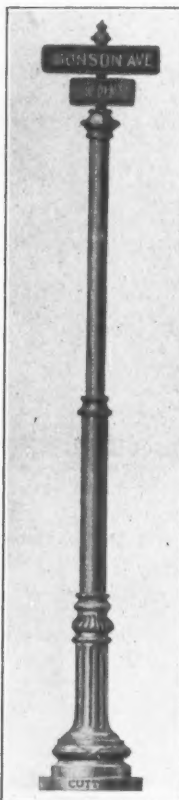
## MUNICIPAL APPLIANCES

### Street Sign Posts.

A street consists of more than a paved right of way—there are various details, street furnishings, to be considered. Among these are street name signs, post boxes, fire and police alarm boxes, trolley poles, public comfort stations, and, perhaps, the various sort of advertisements should be included. A consideration of this subject is independent of any system of street plan. Street lights and street signs were at first left to the care of individuals, being attached by brackets or otherwise to abutting buildings. However, the improvement in means of illumination placing lights under control of central stations, made the problem a civic one. There is a necessary connection between street signs and street lights, because the signs must be illuminated to be valuable. Hence the placing of street signs has become a municipal function.

As a rule, much less attention has been paid to the design of street signs and standards than to lighting fixtures and posts. Most sign posts now in use are simple in design and often crude. Such street furnishings answer the purpose fairly well in outlying sections but it must be recognized that site and apparatus have a relation. A fixture that is suitable for one location is incongruous in another. The economic problem too has a bearing on the relation of furnishings, a costly fixture suited for a showy square, can be dispensed with in outlying districts.

A uniform style of post for streets of similar character adds much to the general appearance of a city. They must to serve their purpose be conspicuous objects of the way, without being obtrusive. Municipal art societies have done a good deal by offering prizes to bring out good designs of street posts. From the commercial side very little has been done. While the manufacturers of handsome lighting standards are many, comparatively few make the effort to place an attractive street sign post on the market. The George Cutter Company, South Bend, Ind., are one of the exceptions. For this reason we have reproduced their "Arcade" sign post. The practical details as well as the design have been carefully worked out.



The base is substantial, 12 inches in diameter, 2 feet 6 inches high. The lower pipe section has a 2½-inch bore, the top pipe section 1¼-inch bore. The height from the sidewalk to the centre of the sign is 9 feet 9 inches.

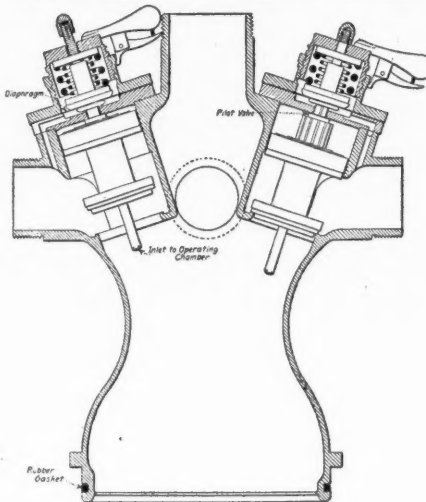
### Universal Crane and Excavator.

The illustration shows the C. O. Bartlett & Snow Co.'s Universal Crane and Excavator used in water work constructing, digging and reservoir with a drag line scraper. The details of one of these machines used in the Pas-saic Valley sewer were given in the Municipal Journal, April 3, page 509. As its name implies the machine is capable of doing a great variety of work. It can be equipped to handle any type of automatic or drag scraper bucket, a skip, steam shovel dipper, drop or steam pile driver hammer and leads or lifting magnet. It can also be used as a yard crane. The general design consists of a structural frame upon which is placed the hoisting and steering drums, a structural A frame, mast, bull wheel and boom. This frame is mounted upon track wheels, traction wheels, skids and rollers or upon a barge. The machine is claimed to have the following desirable features: Lightness resulting from the use of standard structural shapes. Speed, which results from the fact that the boom only swings. Durability, on account of there being few wearing parts. Stability, resulting from low center of gravity and broad wheel gauge. Flexibility, being adapted to many kinds of work.

### Hydrant Head with Pressure Regulating Valves.

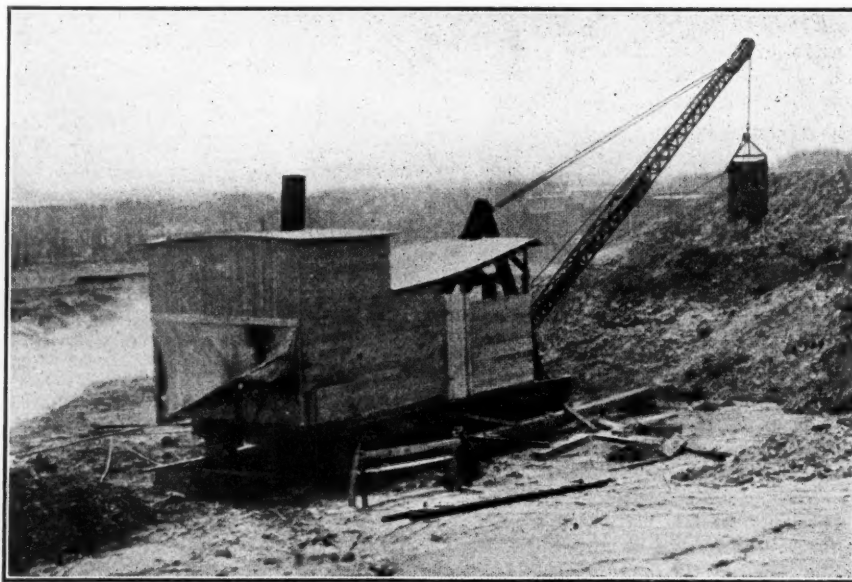
The Ross Valve Manufacturing Company, Troy, N. Y., make a hydrant or more properly speaking hydrant head, which was devised to meet a requirement in connection with the Baltimore high pressure fire service. It was de-

sired to so place a hydrant that a monitor or special flat nozzle could be attached to it in order to form a water curtain, which experience has proved to be the most effective way of stopping the spread of fire across a street. Intersections are among the important locations for placing hydrants for such purposes. Often the corners are already occupied with poles and standards of one sort or another. To meet



ROSS HYDRANT HEAD.

the conditions it was decided that the hydrants must be below the sidewalk grade and that a portable head should be attached to it when in use. This decision moreover made easy the solution of another difficulty. In the Baltimore as in most high pressure systems a pressure of 300 pounds may be required in the mains. At the same time, perhaps not more than 80 pounds pressure might be required in one line of hose and perhaps 150 pounds in another. A pressure reducing valve was therefore made a permanent part of each of the four hose connections. In this way danger of damage from frost and violence was divided and the whole hydrant head with four connections made ready for instant service as soon as it was attached to



UNIVERSAL CRANE EXCAVATING RESERVOIR WITH DRAG LINE SCRAPER.



the main hydrant. By the movement of a small lever the pressure on each hose line is independently regulated. In Baltimore the hydrants are alternated on opposite sides of the streets and are generally located in the centre of the sidewalks.

To describe the head in greater detail: A light bronze casting is fitted with special Ross combination operating and regulating valves controlling each of the four 2½-inch hose outlets. The operating handle is provided with a lever and catch which registers with notches in the cap of valve. These notches are graduated to indicate the pressure carried. An air cock on each opening is provided for a gauge and the fireman in charge of the head at a fire has a gauge he can attach at any time to test the pressure in any of the streams. When operating handle is turned full to the right, water is shut off; turning it to the left turns on the water and to the pressure desired, by allowing the catch to drop in the proper notch. A lock is also provided to prevent pressure greater than 100 to 125 pounds being let into a line without first having orders from the chief in charge. When unlocked and the handle turned full to the left the full hydrant pressure of 300 to 350 pounds is obtained. The lock makes it perfectly safe to handle hose on ladders or inside of buildings, also permits shut-off nozzles to be used in any 2½-inch line. The 3-inch opening in top of head is designed to permit the use of a deluge or special nozzle. It also permits 3-inch lines to be connected and laid a considerable distance beyond the present high-pressure mains, thus extending the high-pressure fire-zone. No regulation is attempted in this opening, full hydrant pressure only would be used. This opening is ordinarily covered with a screw cap.

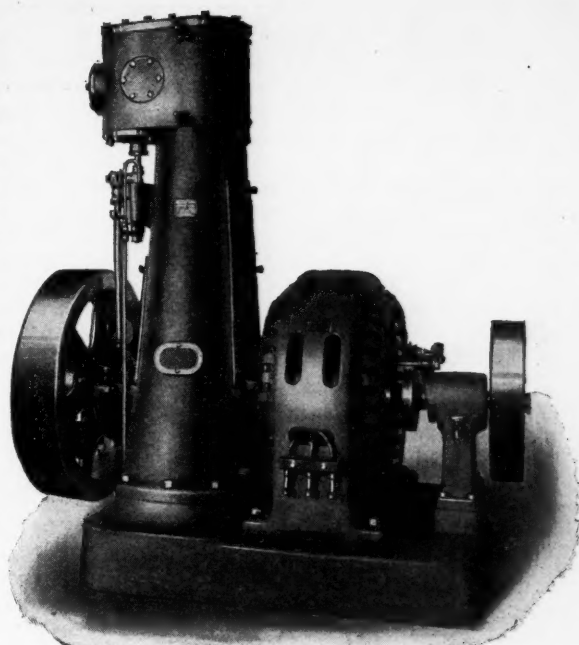
Two handles are provided so that one man can readily lift the head, and, the cover having first been removed from the flush hydrant, drop it in position. A latch shown on side of head holds it in place. The main hydrant

valve is then opened. The connection to hydrant is 10-inch and is made much quicker than the ordinary 2½-inch hose connection can be attached to a hydrant. The heads are carried on the hose wagon or auto-truck with the hose and other fire-fighting apparatus. Only a few heads are required to equip the entire department, while the standpipes or flush hydrants to which they can be attached may number over a thousand. The portable head complete weighs 110 pounds.

#### Alternating Current Direct Connected Generating Sets of Moderate Capacity.

Engberg's Electric and Mechanical Works, St. Joseph, Mich., have made direct current direct connected generating sets for many years. Recently they have brought out an alternating current generator direct connected to their standard vertical engine. The demand for this class of apparatus is said to be rapidly increasing. They are useful in municipal lighting plants that were built for service only part of the 24 hours. Now when there is a demand for current at any time during the day, for electric fans and other light mechanical purposes, about the best way to supply it is to run a light generating set like that described herewith.

The Engberg standard line of alternating generating sets consists of sizes up to 70 k. v. a. capacity in several different speeds. Accessibility and ease of adjustment of all working parts are claimed as merits of these engines. The crosshead is fitted with phosphorous bronze sleeve with wedge adjustment by use of a bolt and lock nut. Crank shaft is of forged steel, counter-

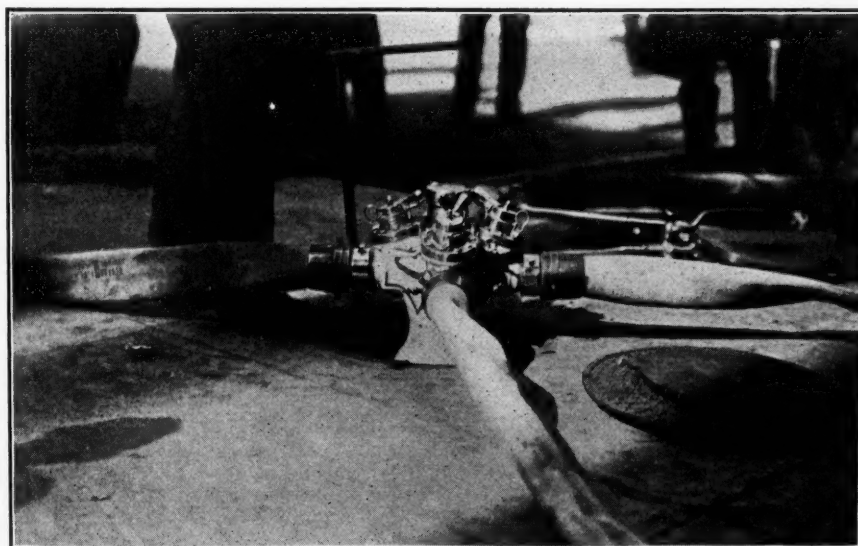


ALTERNATING CURRENT DIRECT CONNECTED GENERATING SET.

balanced. Valve is of the balanced piston type. Flywheel is close to the main bearing of the engine frame. Lubrication is by means of an oil pump and distributing pipes.

The alternators are built to conform to the requirements of the American Institute of Electrical Engineers. They will operate continuously with a lower temperature rise than the A. I. E. E. standard. They will carry a momentary overload of 60 per cent. without injury. Standard voltage are 240, 480, 1200 and 2400. Alternation coils consist of double covered copper wire of highest conductivity. Alternator teeth have an effective support that prevents humming of the luminations, and consequent danger of the insulation. Exceptional merit is claimed for the ventilation system, the back of the core is practically open to the air. The field coils are wound of double covered square copper wire wound on forms of copper ribbon wound edge-wise, making each coil an exact duplicate of all other coils.

**Universal Pipe.**—The Central Foundry Company has called our attention to a slight inaccuracy of a statement which crept into one of our Industrial News notes in our issue of May 22d. The paragraph in question stated that the sections of Universal Pipe were "riveted together instead of being joined with lead and jute." While it is quite true that the Universal Pipe entirely eliminates the old-fashioned caulked joint, it is not a riveted joint, but a bolted joint. The Hub and Spigot ends of the pipe are machined to slightly differing tapers and when drawn together by a couple of bolts, form an absolutely tight, yet flexible joint. In the joint making process the only tool required is a ratchet wrench so the process is one of extreme simplicity.



ROSS HYDRANT HEAD ATTACHED TO UNDERGROUND HYDRANT.



## INDUSTRIAL NEWS

**Cast Iron Pipe.**—Chicago. Failure to issue municipal bonds is holding back order for pipe. Quotations: 4-inch, \$28.50; 6 to 12-inch, \$26.50; 16-inch and up, \$25.50, Birmingham. A scarcity of orders is noted and some pits are down. Smaller sizes are more in demand but the volume of business is comparatively light. Quotations: 4-inch, \$22.50; 6-inch, \$20.50. San Francisco. A fair tonnage has been placed recently and there are a number of new inquiries, though considerable business is being delayed by the difficulty in disposing of bond issues. New York. Demand from private sources has increased remarkably. Quotations: 6-inch, car loads, \$23 to \$24.

**Lead.**—Demand is light. New York, 4.35c.; St. Louis, 4.20c.

**Chicago Cement Show.**—Plans for the next Chicago Cement Show were discussed at the annual meeting of the stockholders of the Cement Products Exhibition Co., on May 13. The report of the Executive Committee favoring only one Cement Show next winter—that to be held in Chicago—was unanimously approved by the Board of Directors. It was decided to hold the Seventh Chicago Cement Show in the Coliseum, Feb. 12 to 21, 1914, which covers a period of eight days and nine nights, not including Sunday, February 15. It has been the policy of the Cement Products Exhibition Co., from the beginning to have the show closed on Sunday whenever the Sabbath comes in the middle of the show period.

The treasurer presented an audit of the company's books made by a firm of certified public accountants which indicated that the company was in excellent condition and conducted both the Pittsburgh and Chicago shows last winter without loss.

For the ensuing year the following stockholders were elected to the Board: Edward H. Hagar of the Universal Portland Cement Co., Norman D. Fraser of the Chicago Portland Cement Co., D. McCool of the Newwaygo Portland Cement Co., J. W. Shove, of the Peninsular Portland Cement Co., W. E. Cobean of the Wolverine Portland Cement Co., D. F. Affleck of the Universal Portland Cement Co., J. U. C. McDaniel of the Chicago Portland Cement Co., George S. Bartlett of the Western States Portland Cement Co., and J. P. Beck of the Universal Portland Cement Co.

Announcement was made of the decision of the Board of Directors of the National Association of Cement Users to hold their tenth annual convention in the City of Chicago in conjunction with the Seventh Chicago Cement Show. This convention of the National Association of Cement Users will be of unusual interest, as the program will be marked by a number of features in celebration of the tenth anniversary of the organization of the association. The National Association of

Cement Users held its first meeting in Indiana ten years ago. Annual conventions have been held in Chicago, Milwaukee, Kansas City, Buffalo, Cleveland, Pittsburgh and New York City.

**Sewer Cleaning Machine.**—The Turbine Sewer Renovating Company, Milwaukee, Wis., have recently received a letter from John A. Holzberger, Director of Public Service, Hamilton, O., commending in the highest terms their turbine sewer cleaning machine and its work in Hamilton. It seems that the recent floods left the Hamilton sewers in very bad condition and some of them completely blocked. A turbine cleaner was sent there for a demonstration. Mr. Holzberger, who is a practical man having been street commissioner before he was director, says in his letter, that he was inclined to doubt the claims made for the Turbine sewer cleaner. After seeing it work, however, he says that it exceeds in merit the claims made for it. It seems incredible, he says, that at a cost of 2¼ cents per linear foot, sewers blocked up as those of Hamilton were after the flood could have been made as serviceable as new. Yet such was the fact. In a letter of the same date to the city council recommending the purchase of the machine the director says that there is no need for him to review the work, accomplished in the demonstration, as the member of council and citizens witnessed it themselves.

**Firestone Tires.**—An automobile race is not ordinarily a matter of municipal interest, but the International Automobile Race at Indianapolis, May 30, developed a test of rubber tires for fire or other fast running automobiles. The race on account of the hot weather and paved track was a battle of tire endurance. The winner and the second machine to cover the line were equipped with Firestone tires taken from ordinary stocks. Other cars had special racing tires, the Firestone company does not make racing tires. The tires of the winning car were the same as the Firestone pneumatics selected for any chief's car or fire apparatus.

**Drilling Outfits.**—The Keystone Driller Company, Monadnock Block, Chicago, Ill., have recently been awarded contracts as follows: At Pine City, Minn., for a Downie double stroke deep well pumping outfit and equipment. At Centerville, Ia., deep well pumping machinery. At Hampton, Minn., Downie double stroke deep well pumping outfit.

**Metal Lamp Standards.**—The Union Metal Manufacturing Co., Canton, O., have issued an attractive catalogue illustrating and describing Union Metal Lamp Standards and wall brackets. These standards and the machines and dies used in their manufacture are covered by numerous patents and pending applications. The shafts of the stand-

ards are made of pressed steel built up of two sheets. In the highest grade the steel is covered by cold rolled copper.

**Patented Arch Bridge.**—Daniel B. Luten has won the suit against Gaffey & Byrnes, which involved the Luten arch bridge patents and was decided in the U. S. District Court for the Northern District of New York on April 29, Judge George W. Ray, presiding. The claim that Gaffey & Byrnes were infringing the Luten patents was sustained.

**Diesel Engines.**—Charles A. Carels, senior member and chairman of the Board of directors of Carels Freres of Ghent, Belgium, builders of Diesel engines, has just arrived in New York. Mr. Carels has come to America to confer with the company's United States representative W. R. Haynie, 30 Church street, New York, upon the advisability of building Diesel engines in the United States and will be in this country for several weeks. During this time he will make an extended trip, covering the important industrial centers, and will visit some of the country's large manufacturing plants, particularly the more prominent tool works. Among the latter the plants of Lodge & Shipley, of Cincinnati, and the Niles-Bement-Pond Company, who, as a matter of interest, furnished a large part of the tools in the works of Carels Freres, will be visited.

**Motorcycles.**—The Hendee Manufacturing Company, Springfield, Mass., are turning out Indian motorcycles in large numbers. Forty-five car loads were shipped from the factory in March. The machine has undergone several recent improvements, among them a cradle spring frame to lessen jolting in riding. The motorcycles are made in 4 and 7 horsepower styles, and the various types of machines include special side car attachments.

**Electric Vehicles.**—The Lansden Company, maker of electric vehicles, will move from Newark, N. J., to Allentown, Pa. A portion of the machinery and equipment of the plant is already on the way. A number of Allentown capitalists and investors are interested in the Lansden Company.

**Motor Trucks.**—Charles K. Thomas has been appointed manager of the Federal Truck Company, 146 W. 52d street, New York City. The Federal Truck Company of New York are distributors for the 1 and 1½-ton trucks of the Federal Motor Truck Company of Detroit and for the 3 and 5-ton trucks of the Standard Motor Truck Company of Detroit.

**Refuse Containers.**—The Climax Refuse Container Co., 109 Broad street, New York City, have recently received an order from the city of Hartford, Conn., for trash containers for their finest parks, after a thorough trial. The Climax Company will also supply street cans for Hartford. Other cities which have recently adopted Climax cans are: Rutland, Vt.; Sylacauga, Ala.; Asbury Park and Long Branch, N. J. The Climax can rests in a frame above the ground and has a lid that is always on.

# WEEKLY CONTRACT NEWS

## ADVANCED INFORMATION BIDS ASKED FOR

## CONTRACTS AWARDED ITEMIZED PRICES

To be of value this matter must be printed in the number immediately following its receipt, which makes it impossible for us to verify it all. Our sources of information are believed to be reliable, but we cannot guarantee the correctness of all items. Parties in charge of proposed work are requested to send us information concerning it as early as possible; also correction of any errors discovered.

### BIDS ASKED FOR

STATE	CITY	REC'D UNTIL	NATURE OF WORK	ADDRESS INQUIRIES TO
STREETS AND ROADS				
O., Marion	.....	noon, June 14	Surfacing pike; \$8,500.	J. K. Leeper, Pres.
N. D., Dickinson	.....	June 15	Concrete sidewalks &c.	R. C. Hill, C. Aud.
O., Struthers	.....	noon, June 16	Vit. brick	I. Eisenbraun, Clk.
Okla., Okemah	.....	June 16	Paving several streets	O. L. Snow, Twn Clk.
N. J., N. Brunswick	2.30 p.m., June 16	16	Macadam roads	P. H. S. Hendricks, Dir.
O., Oakharbor	.....	June 16	Brick paving 1,000 yds.	L. L. Carstensen, C. Clk.
Wash., Everett	2 p.m., June 16	16	Road, 3 1/2 miles	A. L. Willhite, Comr.
Ala., Moulton	.....	June 16	Macadamizing, 3 miles	Co. Bd.
Minn., Minneapolis	.....	June 16	Gravel, 3 roads	Co. Comrs.
Ala., Hayneville	.....	June 16	Grading, 7 miles; cost, \$8,000.	Bd. of Revenue.
Pa., Glenlyon	.....	June 16	Stone road in Newport Township	W. O. Davis, Secy.
N. J., Camden	8 p.m., June 16	16	Paving, repaving, etc.	J. C. Haines, Ch. Comm.
Mass., Boston	.....	noon, June 16	Wood block, brick, etc.	L. K. Rourke, Comr.
Ind., Brazil	11.30 a.m., June 16	16	Paving road	Co. Aud.
O., Lowellville	.....	June 16	Paving with brick	E. J. Maurice, Twp. Clk.
Ia., Pocahontas	.....	June 16	Paving two streets	City Clerk.
Minn., Hibbing	.....	June 16	Two roads	B. J. Benoe, Twn. Clerk.
O., Northrup	.....	June 16	Creolite block floor for bridge	J. S. Clark, Co. Aud.
Canada, Brampton	6 p.m., June 16	16	Concrete road, 5,000 yds.	W. M. Treadgold, Twn. Engr.
Wash., Montesano	1.30 p.m., June 16	16	Improving roads	R. G. Trask, Co. Aud.
Ohio, Poland	.....	noon, June 16	Vit. brick	W. J. Maurice, Twp. Clk.
Ill., Chicago	11 a.m., June 16	16	Cement sidewalks	E. J. Glackin, Sec.
Ia., Sac City	8 p.m., June 16	16	Brick, asphalt, wood, etc.	W. F. Weary, C. Clk.
N. J., Jersey City	2 p.m., June 16	16	Repaving Morgan St.	E. B. See, Clk.
Ind., Crawfordsville	.....	June 16	Cement sidewalks	H. C. McCluer, C. Eng.
Pa., Chester	8 p.m., June 16	16	Paving number of streets	Wm. Provost, Jr., Ch. Comr.
N. J., Camden	8 p.m., June 16	16	Paving, repaving, etc.	J. C. Haines, Ch.
Utah, Salt Lake City	10 a.m., June 17	17	Rock asphalt, paving	N. Warrum, C. Recorder.
O., Columbus	.....	noon, June 17	Paving several streets	S. A. Kinnear, Dir.
Minn., St. Paul	.....	June 17	Roads, 27 miles	Co. Comrs.
Wis., Marinette	2 p.m., June 17	17	Brick and macadam	A. L. Hillis, C. Eng.
N. J., Bayonne	.....	June 17	Asphaltic pavement, 15,500 sq. yds.	W. P. Lee, C. Clk.
Minn., Hastings	.....	June 17	Roads	P. A. Hoffman, Co. Aud.
N. J., Ridgefield Park	.....	June 17	Improving Hazelton Street	V. D. Starkey, Vil. Clk.
Fla., Tampa	2 p.m., June 17	17	Vit. brick, 18,330 yds.; 4 contracts.	Bd. of Pub. Wks.
Fla., Crescent City	.....	noon, June 18	Shell road, 1 mile	P. C. Smith, Clk.
Md., Baltimore	.....	June 18	Vit. brick and granite	Bd. of Awards.
N. Y., L. I. City	11 a.m., June 18	18	Asphalt blocks, asphaltic concrete, granite blocks, etc.	M. E. Connolly, Boro. Pres.
Ala., Montgomery	.....	noon, June 18	Macadam, 3 miles	Bd. of Revenue.
Ia., Boone	7.30 p.m., June 18	18	Sidewalks	O. Hile, C. Clk.
Ill., Chicago	7.30 p.m., June 18	18	Paving number of streets	South Park Comrs.
Ia., Dubuque	.....	June 19	Macadam, 1,740 yds.	J. Daniels, C. Eng.
O., Warren	.....	noon, June 19	Vitrified brick, asphalt, wood, etc.	W. E. Dilley, City Aud.
Wash., Everett	10 a.m., June 19	19	Imp. street	Comrs.
Can., New Hamburg	8 p.m., June 19	19	Cement sidewalks	J. F. Katzenmiller, Clk.
Mass., Holyoke	.....	June 20	Paving two streets	Bd. of Pub. Wks.
Ind., South Bend	10 a.m., June 20	20	Paving two streets	O. C. Bastin, Ch.
N. Y., Olean	6.30 p.m., June 21	21	Vit. brick	Comrs.
Wis., Wauwatosa	4 p.m., June 21	21	Improving several streets	C. T. Chandler, Ch.
N. Y., Solvay	5 p.m., June 21	21	Paving Newton Avenue	E. M. Hall, Clerk.
O., Lockland	.....	June 23	Vitrified brick	F. Reed, Vil. Clk.
Cal., Sacramento	2 p.m., June 23	23	State highways, 29 miles	W. R. Ellis, Sec. Comm.
Wash., Seattle	2 p.m., June 24	24	Imp. roads	Co. Comm.
Ala., Linden	.....	June 24	Surfacing road, 4 miles	Co. Comrs.
Ga., Savannah	.....	June 25	Sheet or block asphalt or creosoted wood, 17,000 yds.	E. R. Conant, Chf. Eng.
Ala., Greenville	.....	June 25	Sand-Clay road; cost, \$10,000.	Co. Comrs.
Ind., Richmond	11 a.m., June 26	26	Improving highway	H. F. Wood, Co. Aud.
Ind., Winchester	.....	June 26	Macadam, 6,625 lin. ft.	H. F. Wood, Co. Aud.
Ia., St. Martinville	.....	June 27	Cement sidewalks	A. B. Bienville, Mayor.
Ala., Birmingham	.....	June 27	Macadam road	Bd. of Revenue.
Ala., Anniston	.....	June 28	Macadam, 1 1/2 miles	Co. Comrs.
Cal., Bakersfield	.....	June 28	Asphaltic concrete	H. F. Murdock, C. Clk.
Mo., Popular Bluffs	7.30 p.m., June 30	30	Vit. brick, 36,000 yds.; cost, \$88,000.	E. C. Thomas, City Eng.
O., Clyde	.....	June 30	Vit. brick, cost \$10,000.	F. Shaw, City Clerk.
O., Euclid	.....	June 30	Vit. brick	F. H. Shoaff, Vil. Clerk.
Ala., Anniston	.....	July 1	Macadam, 1 1/2 miles; cost, \$4,000.	W. S. Keller, State Hwy. Eng.
N. J., Westfield	.....	July 7	Improving East Broad St.	C. Clk.

### SEWERAGE

Ky., Danville	2 p.m., June 14	14	Vit. pipe, 3,700 ft. 8 to 39-in.	J. M. Wallace, Mayor.
N. J., Plainfield	8 p.m., June 15	15	Vit. pipe, 7,800 ft. of 8 to 10-in.	J. T. McMurrey, C. Clk.
Cal., San Diego	.....	June 15	Two septic tanks	W. O. Sandford, C. Eng.
Wis., Marinette	.....	June 15	Brick sewer, 3,300 ft. 36 & 42-in.	A. L. Hillis, C. Eng.
N. D., Dickinson	.....	June 15	Pipe sewer, 10,000 ft. 8 to 15-inch.	W. R. Veigel, City Engr.
Tex., Houston	.....	June 16	Storm sewer, 7,640 ft. of 42 to 102-in.	D. C. Smith, C. Secy.
N. Y., I. I. City	11 a.m., June 16	16	Vit. pipe sewers, various streets	M. E. Connolly, Boro. Pres.
Minn., Ortonville	8 p.m., June 16	16	Sewer system and disposal plant	B. J. Stark, C. Clk.
O., Greenfield	.....	Neon, June 16	Sanitary sewers	E. M. Conner, Vil. Clk.
N. J., Westfield	8 p.m., June 16	16	Pipe sewers, 8,000 ft. 8 to 18-in.	C. Clark, Twn. Clk.
Ill., Waukegan	8 p.m., June 16	16	Tile sewers, 2,700 ft 9 and 10-in.	M. J. Douthitt, C. Eng.
N. Y., L. I. City	7 a.m., June 16	16	Sewers, etc.	M. E. Connolly, Boro. Pres.



## BIDS ASKED FOR

STATE	CITY	REC'D UNTIL	NATURE OF WORK	ADDRESS INQUIRIES TO
N. J.	Ridgefield Pk.	9 p.m., June 17	Sub drains, basins, etc.	M. D. Starker, Vil. Clk.
Neb.	Ralston	10 a.m., June 17	Sewerage system; cost, \$8,000	E. M. Skinner, Ch.
O.	Toledo	Noon, June 17	Local sewer	F. G. Stockton, Secy.
N. J.	Bayonne	June 17	Vit. pipe, 1,200 ft. 12-in.	W. P. Lee, C. Clk.
Pa.	Pulaski	8 p.m., June 17	Vit. pipe, 10 miles 6 to 18-in.	J. T. Loving, Mayor.
Wis.	Park Falls	7.30 p.m., June 18	Vitrified pipe, 10,000 ft. 6 and 8-in.	J. S. Blanchard, C. Clk.
N. Y.	Schenectady	2.30 p.m., June 18	Sewage disposal works	F. E. Johnson, Sec. Bd. C. & S.
Del.	Newark	June 18	System of sewers	Sewer Comm.
Mass.	Boston	noon, June 19	Automatic electric sewage pumping plant	L. K. Rourke, Comr. P. Wks.
Ark.	Brinkley	8 p.m., June 19	Pipe sewers, 7 miles 8 to 12-in.	E. Chaney, Ch.
Ind.	South Bend	10 a.m., June 20	Pipe sewer	A. P. Perley, Clk.
Pa.	Hammonton	June 30	Sewers and disposal plant	Bd. Sewerage.
O.	Port Clinton	Noon, June 30	Sewer several streets	J. A. Singler, Clk.
S. C.	Walterboro	July 1	Pipe sewers, 4 miles, 8 to 12-in.	S. N. Johnston, Eng.
N. J.	Newark	July 1	Three centrifugal pumping engines	J. S. Gibson, Clk. Comrs.
Canada	The Pas	6 p.m., July 1	Vit pipe, 13,000 ft.; also steel pipe, power house, pole line	H. H. Elliott, Secy.
N. J.	Newark	2 p.m., July 15	Submerged concrete pipe, 4,500 ft., etc.	Passaic Valley Sewage Com.
N. J.	Newark	July 15	Section 1, Passaic Valley sewer	Comrs.
La.	New Orleans	July 15	Extension to pumping station	F. S. Shields.
Mo.	Webster Groves	July 21	Vitrified pipe and disposal plant; cost, \$20,000	W. A. Fuller, C. Eng.
La.	New Orleans	July 28	Extending drainage pumping station	F. S. Shields, Secy.
La.	New Orleans	July 28	Underground conduit, gates, etc.	F. S. Shields, Secy.

## WATER SUPPLY

N. Y.	Fort Porter	June 14	Filtration plant, remodelling water system	Quartermaster.
Ill.	Elgin	June 14	Tank and standpipe, etc.	City Clerk.
Ind.	Terre Haute	8 p.m., June 15	Waterworks system	J. C. Kelly, President.
O.	Akron	Noon, June 16	Steel piling, reinforced cement, sheet lead, etc.	R. M. Pillmore, Dir.
La.	Indianola	June 16	Three horizontal tubular boilers	W. A. Graves, City Clerk.
N. Y.	New York	2 p.m., June 16	Tapping valves, etc.	H. S. Thompson, Comr.
Neb.	Norfolk	June 16	Extensions	R. F. Stafford, City Clk.
Conn.	Hartford	June 16	Steel, 7½ miles, 42 to 44-in.	Water Comrs.
Mich.	Ann Arbor	5 p.m., June 16	Reinforced concrete spillway, etc.	C. S. Williams, Eng.
Minn.	Minnesota	June 16	Extending water mains	S. B. Erickson.
Cal.	Los Angeles	2 p.m., June 17	Water meters	J. P. Vroman, Secy.
N. J.	Bayonne	June 17	Cast-iron pipe, 5,000 ft. 8-in.	S. J. Harwy, C. Eng.
Mont.	Billings	June 17	Pumping plant	C. E. Durland, City Engr.
R. I.	Providence	June 18	Pumping plant, 30,000,000 gals.	Bd. Con. & Supply.
Mich.	Saline	6 p.m., June 18	Water works	Homer Fish, Vil. Clk.
Mass.	Boston	noon, June 18	Street castings	C. H. Slattery, Supt. Supplies.
Kan.	Fort Scott	June 18	Pumping engine, 3,000,000 gals.	City Clerk.
Md.	Baltimore	June 18	C.-I. pipe, sluice gates, valves, etc.	Board of Awards.
Minn.	Mayville	10 a.m., June 18	Extension to waterworks and light plant	G. O. Vangen, Aud.
D. C.	Washington	2 p.m., June 19	Cast-iron pipe, 1,400 tons.	Dist. Comrs.
Mo.	St. Louis	June 20	Intake tower, tunnel and screen chamber, cost \$500,000.	E. E. Wall, Water Comrs.
Mass.	Boston	noon, June 20	Sluice gates, assembling hydrants, etc.	L. K. Rourke, Comr.
O.	Painesville	noon, June 21	Intake and crib	S. A. Haskell, Dir. P. S.
Mass.	Boston	noon, June 24	Hydrants for high pressure, 410.	C. H. Slattery, Supt. Supplies.
O.	Euclid	June 30	C.-I. pipe	F. H. Shoaff, Vil. Clerk.
Cal.	Burlingame	June 30	Distribution system	Bd. of Trustees.
N. C.	Goldsboro	July 1	Pumping station, filter plant	Mayor.
N. C.	Cherryville	July 1	Pumping station, electric pumps, reservoir, steel tanks, cast-iron pipe, 5 miles, etc.	J. B. Houser, Mayor.
Ga.	Royston	July 1	Water works and sewers	C. B. Wellborn, Mayor.
Egypt	Calro	July 1	Furn. equipm't for pumpg station, 7,000,000 meters.	Pub. Works Ministry.
Ia.	Decorah	July 2	Cast-iron pipe, 1,000 ft. 4-in., etc.	C. Clk.

## LIGHTING AND POWER

O.	Greenwich	noon, June 14	Generator, controlled panel, etc.	F. H. Daniels, Clk.
N. J.	Camden	8 p.m., June 15	Power station, boiler & generating equipment, electrical work for station & distribution system	F. A. Finkelday, Chrmn. Com.
Canada	Toronto	June 16	Dam and power plant	Adam Beck, Ch.
Ill.	Waukegan	8 p.m., June 16	Cast-iron pipe, 3,200 ft. 6-in., etc.	M. J. Douthitt, C. Eng.
Cal.	San Francisco	June 18	Generator for machine shop	Bd. of Pub. Wks.
O.	Cincinnati	June 23	Lighting system in schools	C. W. Handman, Mgr.

## FIRE EQUIPMENT

N. J.	Red Bank	June 16	Motor triple comb. apparatus	A. C. Harrison, Boro. Clk.
Mich.	Highland Park	8 p.m., June 16	Fire hose, 2,000 ft.	R. M. Ford, Vil. Clk.
Tex.	Fort Worth	June 16	Fire hose, 5,000 ft.	Fire Comrs.
N. D.	Minot	8 p.m., June 16	Auto comb. chem. hose	A. D. Hagenstein, City Aud.
Cal.	Glendale	7.30 p.m., June 16	Fire hose, 1,500 ft. 2½-in., and fire house	G. P. Woodberry, C. Clk.
N. Y.	Buffalo	11 a.m., June 18	Engine house	F. G. Ward, Comr.
Ind.	Elkhart	June 18	Fire apparatus	City Clk.
R. I.	Newport	5 p.m., June 19	Motor comb. chemical and hose, 2 tanks	F. N. Fullerton, C. Clk.
Va.	Clarksburg	4 p.m., June 20	Aerial auto truck and chief's car	Fire Comrs.
Va.	Lynchburg	4 p.m., June 20	Aerial ladder, motor driven; chief's car	W. G. Jones, Ch. Comm.
Ky.	Maysville	June 20	Fire hose, 1,500 ft. 2½-in.	J. C. Everett, Ch. Comm.
N. Y.	Ilion	2 p.m., June 21	Auto comb. chem. and hose	A. E. Dengler, Pres. Village.
O.	Greenville	Noon, June 26	Fire apparatus; cost, \$10,000	H. B. Hole, Clk.

## BRIDGES

Me.	Falmouth	2 p.m., June 14	Concrete bridge	Selectmen.
Ind.	Rockville	June 14	Wooden bridges, etc.	J. E. Elder, Aud.
Ill.	Alhambra	1 p.m., June 14	Three concrete bridges	L. S. Steinman, Twn Clk.
Ill.	Pekin	11 a.m., June 14	Concrete bridges	Co. Clk.
Ill.	Watseka	2 p.m., June 16	Concrete bridge	W. R. Kendall, Twn. Clk.
O.	Batavia	noon, June 16	Repairs and new superstructure	A. Reinhardt, Clk.
Ind.	Brazil	11.30 a.m., June 16	Number of bridges	E. A. Stagg, Co. Aud.
N. J.	New Brunswick	2.30 p.m., June 16	Concrete bridge	A. W. Bissett, Clk. Bd. Freeholders.
O.	Freemont	June 16	Four bridges	Co. Comrs.
Ohio	Zanesville	11 a.m., June 17	Superstructure	H. H. Kennedy, Clk.
O.	Upper Sandusky	June 18	Abutments	P. Frank, Jr., Co. Aud.
Ind.	Marion	10 a.m., June 18	Bridge	E. H. Kimball, Co. Aud.
Ill.	Ottawa	1 p.m., June 18	Concrete bridge; cost, \$3,800	H. T. Marshall, Twn. Clk.
O.	Cincinnati	noon, June 20	Repairing abutments	A. Reinhardt, Co. Clk.
O.	Akron	Noon, June 20	Reinforced concrete bridge	C. L. Bower, Clk.
Ohio	Ashtabula	1 p.m., June 23	Superstructure	A. V. Hillyer, Clk.
O.	Toledo	10 a.m., June 24	Concrete abutments and culverts	C. J. Sanzenbacher, Co. Aud.
D. C.	Washington	2 p.m., June 24	Seven-span concrete bridge	District Comrs.
O.	Youngstown	11 a.m., June 25	Concrete bridges	I. M. Hogg, Co. Aud.
Ohio	Akron	noon, June 27	Number of bridges	C. L. Bower, Clk. Comr.
O.	Cincinnati	noon, June 27	Bridges	A. Reinhardt, Co. Clk.
O.	Cleveland	11 a.m., June 28	Bridge work	J. F. Goldenbogen, Co. Clk.
Va.	Portsmouth	noon, July 1	Number of bridges	E. B. Hawks, Chmn. Comm.
O.	Cleveland	11 a.m., July 2	Concrete bridge	G. F. Goldenbogen, C. Clk.
Penn.	Lebanon	July 7	Concrete bridge	City Eng.

## BIDS ASKED FOR

STATE	CITY	REC'D UNTIL	NATURE OF WORK	ADDRESS INQUIRIES TO
MISCELLANEOUS				
Ala., Cullman	June 16	Building jail	A. G. Coe, City Clk.	
Minn., Winona	2 p.m., June 16	Jail and residence	C. W. Anding, County Clk.	
Minn., Duluth	9 a.m., June 16	Motor cycle	C. S. Palmer, C. Clk.	
Conn., Hartford	11 a.m., June 17	Building bath house	Bd. of Contract.	
N. J., Elizabeth	3 p.m., June 18	Cast-iron culverts	Freeholders.	
N. J., Newark	3.15 p.m., June 19	Auto delivery wagon	R. D. Argue, Secy. Bd.	
Fla., Jacksonville	10 a.m., June 20	Steel tank sprinklers, gasoline pump	E. H. Holmes, Ch.	
Mo., Forsyth	noon, June 20	Jail and sheriff's residence	A. James, Supt.	
Cal., Los Angeles	June 20	Bldg. & operating garbage disposal plant. Reduction or incineration	Bd. of Public Works.	
La., Mandeville	7.30 p.m., June 20	Timber sea wall	W. G. Davis, Mayor.	
O., Akron	11 a.m., June 20	Addition and alteration to jail	C. L. Bower, Co. Clk.	
O., Dayton	noon, June 23	Wire fencing	L. E. Orendorf, Secy.	
N. Y., New York	12.15 p.m., June 24	Section 4 of subway	Pub. Serv. Commission.	
Pa., Harrisburg	2.30 p.m., June 27	Retaining wall, 12,000 cu. yds. concrete	E. C. Thompson, Sec. Bd.	
Pa., Harrisburg	2.30 p.m., July 1	Concrete dam, 1,150 cu. yds.	E. C. Thompson, Sec. Bd.	
N. Y., New York	10 a.m., July 7	Motor trucks, one to ten	M. G. Zallinski, Q. M.	
Del., Wilmington	Noon, July 8	Two ten-ton rollers, steam or gasoline	B. A. Groves, Pres. Levy Ct.	
La., New Orleans	noon, July 28	Traveling crane	F. S. Shields, Secy.	

## STREETS AND ROADS

**Gadsden, Ala.**—Resolution has been passed by City Council to apply oil to Forest ave.

**Marysville, Cal.**—City Council has accepted specifications prepared by Clark & Henery Co. for improvement of B st., from Second to Fourth, and between Fifth and Sixth.

**Los Angeles, Cal.**—Plans are being completed for paving and general improvement of West Adams street from western city limits at Montclair avenue to connection of West Adams and Washington boulevard. Work will be done under supervision of county highway department.

**Sacramento, Cal.**—State Highway Commission has instructed State Highway Engineer Fletcher to make surveys and prepare plans and estimates for construction of additional route No. 13 in San Joaquin, Stanislaus and Sonora counties. Road will be 41.5 miles long and extend from Farmington, San Joaquin county, via Knights Ferry in Stanislaus county; Keystone, Mountain Pass and Jamestown, to Sonora, county seat of Sonora county.

**San Francisco, Cal.**—Plans for construction of first-class highway for automobiles along bay shore through San Mateo county to connect with San Jose, are being discussed.

**Stockton, Cal.**—State highway commission has authorized improvement of road from Farmington to Sonora, and Sonora banks have purchased highway bonds to amount of \$75,000 to assist in general plan of highway development.

**Denver, Colo.**—It is said that Park Board and Highway Commission will jointly appropriate \$30,000 to build boulevard between Denver and Fort Morrison.

**Hartford, Conn.**—Resolutions have been adopted for construction of several new streets.

**Jacksonville, Fla.**—Widening of Union st. is being discussed.

**Tampa, Fla.**—County Commissioners have announced that they will at regular meeting call special election to bond county for \$1,000,000 for purpose of building brick roads.

**Atlanta, Ga.**—June budget appropriates \$3,500 to begin regrading of Whitehall st.

**Dalton, Ga.**—Fully determined to construct excellent highway from government pike to Whitfield county line, good roads men of Catoosa will meet at Ringgold on June 14, to devise ways and means of putting through the project.

**Portland, Ind.**—Resident property owners on East Arch street in this city have filed with city clerk petition asking that thoroughfare be paved.

**Burlington, Ia.**—Resolutions have been adopted for improvement of various streets. Robt. Kroppach is city clerk.

**Clinton, Ia.**—Preliminary steps have been taken by council for putting curb and guttering in Ringwood place between Munson and Arnold streets.

**Des Moines, Ia.**—City Council has adopted resolutions for various street improvements.

**Topeka, Kan.**—Bids will be advertised for repaving of various streets. C. B. Burge is city clerk.

**Jeffersonville, Ky.**—Resolutions have been adopted for improvement of parts of Woerner ave., Montgomery ave., Lee st. and Beckett st.

**Mt. Sterling, Ky.**—Montgomery Fiscal Court has set aside \$4,000 to build model road in this county.

**Baton Rouge, La.**—Issuance of \$225,000 bonds for public improvements has been authorized, of which \$90,000 will be for paved or gravel-d streets.

**Hammond, La.**—Petition is now being circulated and generally signed, asking police jury to create road district of this portion of ward, when election will be held to vote special road tax. It is probable that \$75,000 of bonds will be issued with which to build Tangipahoa's part of Baton Rouge to Covington road, it being intention to gravel entire 15 miles across parish, bridges on road to be built of concrete and steel.

**Lafayette, La.**—Special good roads tax levied by Lafayette in aid of parish highways has been carried by vote of 187 for and 115 against.

**Lake Charles, La.**—If plan adopted by sub-committee of parish Good Roads Committee, and approved by that organization, meets with approval of police jury and be regarded favorably by taxpayers, bond issue of \$750,000 will be issued for construction of roads in parish, and additional revenues from parish treasury estimated to amount to \$500,000 in 25 years that bond tax will run, will raise amount available to \$1,250,000.

It is calculated that this amount of money would provide for network of roads extending throughout parish in every direction and covering 200 miles.

**New Orleans, La.**—With overwhelming majority people have voted for issuance of \$200,000 worth of bonds, proceeds of which will be used to build model roadways through Fourth and Fifth Wards on left bank of river and Seventh, Eighth and Ninth Wards on right bank.

**Plaquemine, La.**—Road election for voting on incurring indebtedness of \$12,000 to build gravel road from White Castle to upper line of Ascension Parish has been carried.

**Baltimore, Md.**—Residents along Belair road are preparing to make strenuous campaign for good roads.

**Baltimore, Md.**—Baltimore city authorities having refused to pave connecting links with State roads in city out of paving loan as suggested by Chairman Weller of State Roads Commission; the latter body has decided to do work on Reisterstown road and Frederick ave. this year.

**Lowell, Mass.**—County commission have opened bids on construction of Acton road, so-called, in South Chelmsford. Bids called for price of gravel road as well as macadam road. Gravel road would be two miles long and the macadam would include these two miles and one mile of gravel road built in 1911. Bids received were as follows: Antonio Pallotto, Lowell, gravel, \$5,768; macadam, \$13,140.50. W. H. Whitaker, Lexington, gravel, \$5,889.50; macadam, \$17,387. A. Michelini, Reading, gravel, 6,246.50; no macadam bid. H. W. Tarbell, Lowell, gravel, \$6,810.35; macadam, \$15,720.35. Thos. Bruno, Boston, gravel, \$7,560; macadam, \$17,049. County commissioners have voted to adopt gravel road construction, leaving question of macadam for future consideration. Commission did not award contract.

**Ablon, Mich.**—Various street improvements have been authorized.

**Grand Haven, Mich.**—Special committee of three men will meet representatives of Chicago bonding firm to arrange for disposal of another \$100,000 of Ottawa county road bonds.

**Grand Haven, Mich.**—Another \$100,000 of Ottawa county road bonds will be disposed of.

**Houghton, Mich.**—Work on surfacing of West Sheldon street is expected to be started next month by board of public works. Construction includes placing of top dressing of fine rock, mixed with a binder, which will be thoroughly rolled into hard, firm street surface.

**Monroe, Mich.**—At a special election a charter commission was elected and proposition to bond city for \$15,000 for paving purposes was carried by large majority.

**Traverse City, Mich.**—Berrien county, which comes next to Indiana line, has voted to issue bonds in sum of \$500,000; Ottawa county has bonded in sum of \$600,000, and Mason county in sum of \$105,000. Covert township in Van Buren county, which borders on the lake, voted to bond for \$25,000, four townships in Benzie county have decided upon bonding in sum of \$60,000, and two townships in Leelanau county in sum of \$20,000, two townships in Grand Traverse county to the amount of \$40,000 and one township in Antrim county for \$20,000.

**Duluth, Minn.**—Ordinance directing condemnation of right-of-way of \$1,000,000 boulevard to be constructed from Duluth to Two Harbors along north shore of Lake Superior has been introduced at meeting of city commission.

**Mankato, Minn.**—Plans for raising \$7,500 needed to complete \$75,000 fund for the Minnesota valley scenic highway are being discussed.

**St. Paul, Minn.**—Snelling avenue between Grand and University will be paved this year with creosoted blocks.

**St. Paul, Minn.**—Board has passed final orders for paving of Arcade st., from Case to Maryland and East Seventh to Maryland, with brick. Final order for paving of Case st., from Payne to Westminster, has also been passed.

**St. Paul, Minn.**—State highway commission has approved of 486 miles of new roadway in Minnesota to cost \$369,898 and apportioned among counties as follows: \$32,874 in Aitkin, \$11,755 in Hubbard, \$80,752 in Itasca and \$244,517 in Koochiching.

**Two Harbors, Minn.**—Grading of 8th avenue is being discussed.

**Chillicothe, Mo.**—Plans are being made for improving Walnut st.

**St. Joseph, Mo.**—Paving of road from Wathena to Grand Island bridge is being planned.

**St. Joseph, Mo.**—Property owners along Church street, from 10th to 13th, have filed a majority petition with board of public works asking for oiled macadam for material for resurfacing the street. Petition has also been filed asking for mineral rubber asphalt for resurfacing of 9th street from Robidoux to Hall.

**Cranford, N. J.**—Ordinances for improvement of South ave., between Union ave. and Rahway River, and for improvement of Hamilton ave., between Elizabeth ave. and Arlington rd., have been passed upon final readings.

**Jersey City, N. J.**—Bids will be received by Board of Chosen Freeholders of County of Hudson for purchase of \$60,000 Newark Plankroad improvement



bonds and \$110,000 boulevard repair bonds. Walter O'Mara is Clerk.

**Kenilworth, N. J.**—At June meeting of Kenilworth borough council, resolution was passed to macadamize Boulevard from 20th street to Rahway Valley R. R., Michigan avenue from Boulevard to Roselle Park line at Aldene, and 22d street from Boulevard to Washington avenue, with a short connecting link from 21st to 22d street in Washington avenue.

**Lambertville, N. J.**—Resolution has been adopted asking for state aid in improving old Brunswick pike and other streets.

**Paterson, N. J.**—Board has approved plans for improvement of Midvale-Greenwood Lake rd., from end of present improvement to bridge west of Cooper's Hotel.

**Perth Amboy, N. J.**—Ordinances have been passed for improvement of various streets.

**Perth Amboy, N. J.**—Ordinances have been introduced and passed upon their first reading for paving of various streets.

**Perth Amboy, N. J.**—Ordinance to authorize issuance of street improvement bonds to amount of \$97,000 has been passed.

**Rahway, N. J.**—Preparations are being made by Alvin B. Fox to make preliminary survey of proposed state highway route from Rahway to New Brunswick.

**Roosevelt, N. J.**—Construction of road is planned leading from Rahway ave., Roosevelt, to Rahway ave., Woodbridge. It will cover distance of 3 3/4 miles, and will lead by Blazing Star road.

**Westfield, N. J.**—Ordinance to improve Dorin road, Hazel avenue, Scotch Plains avenue and St. George place, has been introduced and passed upon first reading.

**Long Island City, L. I., N. Y.**—The Queens local boards have passed resolutions initiating 33 highways and sewer improvements, the estimated cost of which aggregates \$384,010.

**Mineola, L. I., N. Y.**—Board of supervisors of Nassau county has authorized bond issue amounting to \$500,000 for construction and maintenance of roads in Nassau county.

**Newburgh, N. Y.**—Committee has instructed City Engineer Blake to obtain bids for paving of that part of Third st. between Water and Front sts., material used to be old granite blocks taken up from Colden and Water sts.

**Rockaway Beach, N. Y.**—Proposition to have bay front boulevard from Edgemere down to Neponsit is being discussed.

**Rome, N. Y.**—Plans and specifications have been ordered for improvement of Bloomfield st., from Madison to Jay; Jay st., from Dominick to Embargo; River st., from Dominick to St. Peter's ave.

**Schenectady, N. Y.**—Ordinance has been passed directing repaving of North Ferry street. Frank Cooper, corporation counsel.

**Lexington, N. C.**—Davie County has carried a \$175,000 good roads bond issue by over 600 majority.

**Wake, N. C.**—Date fixed by Legislature for bond election in Wake for a million dollars of good road bonds is August 12. Commissioners will issue regular call for this election. Madison has voted \$300,000 in road bonds.

**Sentinel Butte, N. D.**—Road between this town and Medora will be built at once.

**Akron, O.**—Bids will be opened by County Commissioners June 18 on \$160,000 worth of bonds for purpose of making repairs to roads and bridges in county.

**East Youngstown, O.**—Ordinances have been passed under suspension for paving Short st., from Robinson rd. to Sheet and Tube bridge, grading, sewerage and sidewalking 12th st., from Tenney ave. to Blossom ave.

**Hubbard, O.**—At meeting of Township Trustees resolution to issue bonds for road improvement amounting to \$35,000 was passed, the remaining \$15,000 voted on to be retained to pay township portion of state road tax. Clerk was authorized to advertise for bids for five consecutive weeks, date of sale to be July 5, at 10 o'clock.

**Toledo, O.**—Ordinances have been passed providing for improvement of various streets.

**Eugene, Ore.**—Steps to order 34 1/2 blocks of hard surface pavement, the opening of bids upon \$133,850 worth of bonds, passing ordinance for issuance and sale of \$25,000 additional street intersection bonds, and purchase of street

flusher and grading machine, have been principal actions taken by Common Council at their last meeting.

**Eugene, Ore.**—Ordinances passed call for paving Pearl st., from Eleventh to Fifteenth, 34 ft. wide; Tenth, from Pearl to Mill st., and Mill st., from Tenth to Eleventh; High st., from Eleventh to Thirteenth, 34 ft. wide; Pearl st., from Fourth to Sixth, 34 ft. wide; Spring blvd., four blocks to city limits, 18 ft. wide; Oak st., from Eleventh to Thirteenth, 38 ft. wide. Ordinances placed upon the first reading include Charnelton st., from the railroad to Eleventh, 42 ft. wide; Alder st., from Eleventh to Thirteenth; Fourth ave. west from Charnelton st. to Blair, 30 ft. wide.

**Butler, Pa.**—Work on resurfacing of macadam road north of Butler will probably be commenced during coming week.

**Chester, Pa.**—Specifications for paving of all streets of borough are in preparation and they will provide for cost for various kinds of material.

**Erie, Pa.**—Various street improvements have been authorized.

**Erie, Pa.**—Resurfacing of Parade street from 18th street north is being considered.

**Philadelphia, Pa.**—Extension of Northeast boulevard from York road to 16th street is being considered; also paving of Locomotive street.

**Britton, S. D.**—At recent good roads meeting plans were discussed for construction of the north line of Twin Cities-Aberdeen-Yellowstone Park trail. It is planned to run north branch from Graceville, Minn., across Sisseton reservation in South Dakota to Britton. From Britton road will run south and west to Amherst, thence to Claremont, and then in southwesterly direction to Aberdeen, where it will join main trail.

**Bartlett, Tex.**—Election has been ordered to determine whether \$50,000 bonds will be issued for purpose of improving roads in District No. 2 of Bell county.

**Comfort, Tex.**—June 17 has been selected as date for holding of election to determine whether Kendall county will issue bonds for improvement of county roads. Precinct No. 1 will be affected by election.

**Corpus Christi, Tex.**—Voters of Nueces county will, upon July 19, authorize or refuse to authorize issuance of \$750,000 in bonds for improvements. Of amount named \$500,000 of bonds will be for purpose of giving Nueces county 200 miles of modern highways and remainder of the amount, \$250,000, will be for erection in Corpus Christi of new court house and county jail.

**Corsicana, Tex.**—On June 28 people of Barry good roads district, ten miles west of here, will vote as to whether or not they will issue \$75,000 in bonds for public road improvements.

**Corsicana, Tex.**—County Auditor H. G. Johnson has returned from Austin, where he submitted records of good roads bonds issue election held here few weeks ago. Records were approved and bonds, \$400,000, will be printed and sold.

**Dallas, Tex.**—Widening of Welborn street between Maple and Fairmount and taking out of offset has been recommended to board of municipal commissioners by Street Commissioner Scott and approved.

**Dallas, Tex.**—Planning series of 12 permanent macadam roads, each 8 miles long, radiating like spokes of wheel from city of Corsicana as hub, commissioners of road district No. 1 of Navarro county have employed Fred A. Jones Engineering Co., of Dallas, to furnish surveys and specifications for work. District has been bonded for \$400,000, and it is proposed to spend this money on construction of 100 miles of very best type of macadam roads with concrete bridges, etc.

**Dallas, Tex.**—County Commissioners' Court has instructed County Engineer J. F. Witt to prepare and submit to court estimate upon cost of paving viaduct with creosoted wood blocks to replace present covering of asphalt macadam, which has grown very rough. Roadway of viaduct that would have to be paved has total length of 6,300 ft., including 500 ft. of the section lateral at Oak Cliff approach, and is 41 ft. wide for entire distance. Cost of paving would have to include laying proper base for wood blocks.

**Denton, Tex.**—Sanger precinct is preparing to vote on road bond issue of \$125,000. This will make fourth justice precinct in county to vote on bonds in near future or with bonds already issued.

**San Antonio, Tex.**—Widening of Commerce st., from Main Plaza to Alamo st. is urged.

**Temple, Tex.**—Belton City Council has ordered election to be held July 2 for purpose of passing upon issue of \$74,000 in bonds, of which \$54,000 are for permanent street improvements and \$24,000 for water works improvements and extensions.

**Tyler, Tex.**—The Commissioners' Court has ordered, July 8, election for Tyler District to determine whether or not road bonds to amount of \$300,000 be issued.

**Brighton City, Utah.**—Paving of 20 blocks in 2d and 4th wards is under consideration.

**Jonesville, Va.**—Two of magisterial districts of Lee county, Rocky Station and Rose Hill, will vote on additional issue of road improvement bonds on June 24.

**Newport News, Va.**—Recommendation asking appropriation of \$400 for carload of glutin with which to treat all streets needing such treatment has been passed, preparation to be shipped July 1.

**Richmond, Va.**—City Engineer has been directed to prepare and submit estimates for grading Carrington st., between the Mechanicsville turnpike and Twentieth st., and Short P st., between Nineteenth and Twentieth sts., revised grade.

**Richmond, Va.**—Appropriation of \$5,000 has been made for opening & widening streets.

**Pullman, Wash.**—Number of important petitions will come before Pullman City Council relative to creation of paving districts in residence portions of town. Resolutions will be introduced by property owners along Kamiaken st. for three blocks of pavement, starting at Northern Pacific depot and running parallel with Star Route to Ash st.

**South Bend, Wash.**—City Councils of cities of South Bend and Raymond are discussing building of boulevard between the two cities.

**Superior, Wis.**—Resolution has been adopted for street improvements and Highway Commissioner has been directed to prepare plans and specifications and advertise for bids for following work: Grand ave.: Making outlet ditch and draining road, \$100. Central State road: Three-fourths mile between Bennett and Solon Springs, \$600. Spaulding ave.: From township line between towns of Amnicon and Parkland, one mile east, grading hill east of Amnicon River, and building bridge over same river, \$7,168.40. Winnebijou road: Graveling from South Shore R. R. west across swamp, \$400. Highland road: From n. e. cor. s. e. s. e. 3-46-10 to Winnebijou, \$500. Bardou ave.: One mile through center Sec. 13, T. 48, R. 14, \$1,200. Black River road: From Rossiter ave. 3/4 mile west; bridge at Little Balsam Creek and grading hills, \$2,000. Winnebijou road: From present road east of South Shore R. R. on west side of river, along said South Shore about 1,500 ft., \$300. Totagatic road: From 400 ft. west of Cor. Secs. 26, 27, 34, 35 T. 43, R. 12, west 2,000 ft., \$600. Greenwood road: To complete this road and other uncompleted contracts, \$10,000. Total, \$23,368.40.

**Superior, Wis.**—Municipal building of sidewalks and pavement repairing is being discussed.

**Superior, Wis.**—Movement has been started with view to inducing owners of property along 21st st. between Hammond ave. and West Fifth st. to have street turnpiked and brought up to grade.

#### CONTRACTS AWARDED.

**Los Angeles, Cal.**—To M. W. McComb, 516 Bryson Bldg., contract at \$49,000, for constructing sidewalks, curbs and gutters in Road District No. 18, Lamanda Park.

**Sacramento, Cal.**—The State Highway Commission has awarded a contract to Leigh Garnsey, at \$51,869, for the construction of about 7 1/4 miles of state highway in Ventura County, from the southern boundary to Newberry Park. Austin B. Fletcher is State Engr. Noted May 15.

**San Francisco, Cal.**—Contract has been awarded by this city to C. L. Robinson, of Los Angeles, to pave with asphalt and to curb and sidewalk six streets south of the Southern Pacific tracks. Contract price is \$43,313. When this work is completed it will link up practically every part of city with various boulevards.

**Boulder, Col.**—By county commissioners, contract to E. J. Carter of Boulder for construction of nine miles of macadam highway between Boulder and Lafayette, which will make ten miles of additional automobile highway between Boulder and Denver. Bids will be opened June 14 on ten more miles between Lafayette and Broomfield.

**Denver, Colo.**—Two paving contracts amounting to \$20,505 have been awarded by Board of Public Works to Hughes & Denny. First takes in paving of alleys between Thirteenth and Fourteenth sts. from Larimer st. to Colfax ave. Second provides for paving of alleys between Nineteenth and Twentieth sts. from Wewatta to Welton sts.

**Hartford, Conn.**—Highway Commissioner Charles J. Bennett has awarded contract to Charles M. Beard, for construction of about 2,200 ft. of road in Middlebury. Price for gravel is \$2.10 a lin. ft., for telford \$3 and for rubble drain \$1.25.

**Waterbury, Conn.**—By Superintendent of Streets to John Altieri contract for laying curb on E. Main st.

**Delaware City, Del.**—Contract for building new streets here has been awarded to Harrigan Contracting Co.

**Wilmington, Del.**—By Commissioners of New Castle County, contract for construction of macadam road from Stanton to Oak Tree to Thos. R. Claringbold, Newark, Del., at \$4,995. Other bidders were: John F. O'Neal, Mount Cuba, Del., \$5,384; Stewart & Donohue, Wilmington, \$5,991; John A. Clark, Wilmington, \$5,780; E. E. Crumlish, Wilmington, \$6,740; Juniata Paving Co., Philadelphia, Pa., \$6,155; Alfred McDowell, Marshalon, Del., \$5,956.

**Frankton, Ind.**—For construction of new gravel road, the road running past the U. B. Church, to A. B. Huffman, of Noblesville, at \$3,000.

**Indianapolis, Ind.**—Lackey Bros. have assigned to A. D. Bowen their contract for paving first alley east of Park avenue, from 21st to 23d streets, with consent of board of public works. Contract is for a brick pavement to cost \$2.16 per lin. ft. on each side of alley.

**Indianapolis, Ind.**—Contracts for furnishing road oil to county have been awarded to Standard Oil Co. and Barber Asphalt Co. by board of county commissioners. Standard Oil Co. will supply about 114,000 gallons of oil at 4.95c, a gallon, and other company will furnish about 36,000 gallons of specially prepared oil at 6 1/2c, a gallon. The bid of the Indian Refining Co. at 4 1/4c, a gallon was not accepted by board because it was not filed on time.

**Fort Scott, Kan.**—For paving of 9th street, to Thogmartin & Gardner.

**Henderson, Ky.**—Fiscal court of this county has awarded contract for metal culverts for roads of this county to Harry Bros., of Covington, for approximately \$4,000. There were 14 bidders.

**Baltimore, Md.**—Frech & Allen, a paving concern of Westminster, Md., has secured Annex Commission Contract No. 118 for sheet asphalt paving on Hilton street. Bid of the Westminster concern, \$68,200, was much lower than that of Pen-Mar Construction Co., the next lowest bidder. Bids were opened by board of awards for Annex contracts Nos. 115 and 119, for bituminous concrete and vitrified brick, respectively. P. Flanagan & Sons is apparently lowest bidder for first named, quoting \$1.45 a sq. yd., and Thos. Mullen at \$2.24 for latter.

**Baltimore, Md.**—The Eastern Paving Co. and M. J. Beach have been each awarded paving commission contracts by Board of Awards. Contract No. 56, for vitrified brick paving on West st. from Light to Riverside ave., went to Eastern Paving Co. Bid was \$6,555.25. M. J. Beach was awarded Contract No. 57, for vitrified brick on Central ave., from Fawn to Fayette sts. Bid was \$27,410.

**Duluth, Minn.**—For paving of 27th avenue, to George R. King.

**Duluth, Minn.**—By City Commission, contract for paving Grand ave. with concrete to S. A. Riches at \$40,594. C. S. Palmer is City Clk.

**Pascagoula, Miss.**—By board of supervisors to W. J. Brunson, contract to build a road in District No. 3, at \$390.

**Atlantic Highlands, N. J.**—For retaining walls and sidewalks to Joseph Caruso for section of Ocean highway.

**Cranford, N. J.**—Contract for cement sidewalks in several sections of town has been awarded to Elmer Moore at 49 cts. per lin. ft.

**Jersey City, N. J.**—The Dock Contracting Co., of Hoboken, will probably receive contract for repaving Ferry st. Company's bid, submitted to Common

Council, was \$77,681. Other bids received were from William Van Keuren, Jersey City, \$81,091; Standard Bitulithic Co., New York, \$80,760; Clinton Contracting Co., Union Hill, \$90,825; Thomas Cavanaugh, Hoboken, \$90,388; R. Waddington, Hoboken, \$87,669; William Coughlin, Jersey City, \$85,494.

**Long Branch, N. J.**—Second avenue in all probability will be paved with Metropolitan brick at \$2.48 per sq. yd. instead of Mack brick at price of \$2.59. Board of commissioners has passed ordinance, offered by Commissioner Woolley, rescinding action taken on May 10, awarding contract for paving Second avenue to Morris C. Burns for Mack brick at \$2.59 per sq. yd. and substituted in its place Metropolitan brick at cost of \$2.48. Resolution directs that mayor and clerk be directed to execute new contract with Mr. Burns in behalf of city of Long Branch.

**Morristown, N. J.**—Contract for rebuilding and repairing roads of Madison has been awarded to Fred Smith of Morristown. Mr. Smith agreed to put roads in shape at 43c a sq. yd. where old macadam is and for 62c. per sq. yd. where it is necessary to make new macadam.

**Passaic, N. J.**—By Common Council, contract for paving Temple pl. to John T. Harrop, Garfield, N. J., at \$10,354. Colin R. Wise is City Engr.

**Trenton, N. J.**—For paving of Asbury st., from Ferry st. to Steamboat st., bituminous concrete, to the Newton Paving Co., at \$1.62 per sq. yd. for Star asphalt, guaranteed for one year; total of bid, \$2,978.55.

**Hornell, N. Y.**—At meeting of Board of Public Works bids for paving of Church, Collier, Jane, West, Hornell and Canisteo sts. and Lucretia ave. were opened. It was found that local firm of Witt & Blades were low for paving of all streets, except Church. Their bids for work were as follows: Collier st., \$4,039.44; Jane, \$7,505.62; Hornell, \$5,681.06; Canisteo and Lucretia ave., \$1,917.19; total, \$22,476.90. The Greenfield Construction Co.'s bid of \$5,632.40 for paving Church st. was low.

**New York, N. Y.**—By President of Borough of Queens, Fifth St. and Jackson ave., Long Island City, following contracts for paving of various streets: Riker ave., from Woodside ave. to Kelley ave., to the Freeman-Hess Co., at \$11,994; on Webster ave., and on Wilson ave., to the Hastings Paving Co., at \$71,120 and \$16,856, respectively; Wilbur ave., from William st. to Academy st., to the Barber Asphalt Paving Co., at \$10,399; Jackson ave., from Woodside ave. to Train Meadow Rd., U. S. Wood Preserving Co., at \$62,565; Harold ave., from Thompson ave. to Skillman ave., to Daniel Donovan, at \$9,856. Maurice E. Connolly is Pres.

**Niagara Falls, N. Y.**—By Board of Public Works contract for bitulithic pavement on 11th and 14th sts., to Warren Bros., at \$2.49 per sq. yd. The McKinney & McGuire Co. was awarded the contracts for paving Chilton and Elmwood aves. with asphalt blocks at \$4.406 and \$6.040, respectively. F. S. Parkhurst Jr. is City Engr.

**Niagara Falls, N. Y.**—The report on who are low bidders for paving in Lockport and Ninth sts. has been received from city engineer. The Read-Coddington Co. is low on asphaltic concrete, Hassam and Sterling block for Lockport st., while Warren Bros. are low on bitulithic, and Public Service Contracting Co. is low on Penn block. On Ninth st. job, Read-Coddington are low on asphaltic concrete, Hassam and Penn block. Warren Bros. are low on bitulithic and Public Service Contracting Co. is low on Metropolitan and Sterling brick pavements. Kind of pavements to be laid have not been selected yet.

**Niagara Falls, N. Y.**—Bd. Pub. Works has awarded contract for paving of Walnut ave., between Ninth st. and Portage rd. with asphaltic concrete, a pavement new to Niagara Falls, to the Read-Coddington Engineering Co. The contract price is \$2.35 a sq. yd.

**Schenectady, N. Y.**—Only one bid was received for relaying Albany street from Hulet to Craig, made necessary by sewer break when street was torn up. J. W. Davitt bid \$1.66 per sq. yd. for 1,040 yds. Contract was awarded to him.

**Schenectady, N. Y.**—Objection by certain members of board of contract and supply was cause of deferring award of contract for laying wood block paving on Lower State street. Bids were received from three contractors for wood block paving. J. W. Davitt, the Troy contractor, bid \$3.44 per sq. yd.; the Schenectady Contracting Co., \$3.35; John McEnroe of Schenectady, \$3.88. The

contracting company's bid was lowest. Mr. McEnroe's bid was received five minutes after the specified time. Alternate bids for sheet asphalt having been advertised, only one bid was received, that of Mr. Davitt, whose figure was \$1.70, for stone-filled wearing surface.

**Troy, N. Y.**—The contract for paving River st., from Ferry to Adams st. with granite block was awarded by the Bd. of Contract & Supply to the Parker-Hassam Co.

**Utica, N. Y.**—To Harry W. Roberts & Co., of this city, contract for paving section of James st. Members of the Board of Contract and Supply designated asphaltic concrete as kind of pavement, and artificial stone as variety of curbing.

**Akron, O.**—Although contracts for improvement of East Market street have not been awarded, probable winners may be picked from totals of lowest bidders. These contractors entered their bids as follows for improvement of section No. 1, which extends from High street to Union depot: P. T. McCourt, for brick \$41,655, for stone \$76,592; Wildes & Davidson and E. McShaffrey & Son, for brick \$42,211, for stone \$73,721; S. W. Parshall, for brick \$42,881, for stone \$75,499. Bids were also entered for different sizes of creosote block. Following were received for section No. 2: Sheehan & Breen, for brick \$68,956.20, for stone \$126,383; P. T. McCourt for brick \$64,297.80, for stone \$114,951.80; S. W. Parshall for brick \$65,300.70, for stone \$116,838.20; Wildes & Davidson and E. McShaffrey & Son, for brick \$64,298.80, for stone \$113,185.80; McAlonan Bros., for brick \$71,873.30, for stone \$116,048.30; Alex. N. Todd, for creosote block, 3-inch, \$95,437.80. In all probability P. T. McCourt will be awarded contract for section No. 1 in case brick is used. Wildes & Davidson and E. McShaffrey will probably receive contract if stone is used. It is also likely that P. T. McCourt will receive the contract for the improvement of section No. 2 if brick is used. Wildes & Davidson & McShaffrey were low on bids for stone.

**Canton, O.**—To Contractors Wise, Smith and Krabill, contract for paving Canton-Cairo road for distance of seven miles from Canton corporation limits, by county commissioners. Their bid of \$115,507 was lowest of five bids. Haines & Miller of Akron were successful bidders for paving of Alliance-Marboro road for distance of four miles. Work will cost \$77,646. There were two other bidders. When this strip is completed Marlboro and Alliance will be connected by paved roadway.

**Sunbury, Ohio.**—By Village Council to Lambert Bros. & Wirt, Delaware, O., at \$23,000, for 10,600 sq. yds. paving on eight streets.

**Wooster, O.**—For improvement of various streets to Midland Construction Co., of Lima, O., as follows: Pittsburg ave., \$25,474.34; College ave. Ext., \$5,140.88; Nold ave. West end, \$5,646.86; Nold ave. East end, \$6,103.90; Derr ave., \$2,123.20; West Liberty st. rd., \$9,172.40, and South Walnut st., \$10,178.45. T. P. Brown, City Civil Engr.

**Youngstown, O.**—By Board of Control the following contracts for street improvements were awarded: Rice ave., grading, Charles Harris, \$813.40; Coral st., grading, Gallagher & Aaron, \$262; Fleming st., grading, Gallagher & Aaron, \$577; Fairmont ave., paving, Kennedy Bros., \$8,698; Wabash ave., paving, Kennedy Bros., \$7,278.80; King st., paving, Kennedy Bros., \$3,309.80. All contracts were awarded to lowest bidders.

**Eugene, Ore.**—Council has let contract to Eugene Sand & Gravel Co. for grading and macadamizing of Seventeenth ave., from Mill to Alder st., for \$2,318.18.

**Eugene, Ore.**—County court has opened bids for macadamizing of certain parts of county roads which have been advertised for some time and awarded contracts for all work near Eugene to Eugene Construction Co. and near Cottage Grove to Ambrose-Burdal Co. Lowest bid for macadamizing of the road between McVey's point and Goshen and on Elmira road was Eugene Construction Co. at \$22,889, or about \$5,530 per mile. Contract for mile and a half of road in two sections of three-quarters of mile each near Cottage Grove has been awarded to Ambrose-Burdal Co. at \$10,035.

**Portland, Ore.**—Bids for 42 different street improvements which will cost property owners affected over \$500,000 have been opened by city council. Over one-half of these improvements provide for hard surface pavement, but most of jobs are small. Largest of jobs on which



bids were received is for improvement of Willamette boulevard, from Wabash avenue north to the S. P. & S. track, which is to be hard-surfaced. The bid of the Warren Construction Co. for gravel bitulithic totaling \$76,949, was lowest. Next largest job is for improvement of Holgate street district, for which the Oregon Hassam Paving Co. submitted lowest proposal, amounting to \$64,962. The Barber Asphalt Paving Co. proposed to pave with gravel bitulithic, Greeley street from Killingsworth to Lombard, for \$46,841, which was considerably lower than any other bid, and Montague-O'Reilly Co. presented low bid for paving East 13th street from Ochoco to Malden with asphaltic concrete for \$44,698.

**Philadelphia, Pa.**—Asphalt paving work to value of \$125,000, has been awarded by Director Cooke. Eastern Paving Co. got \$40,000 worth at prices ranging from \$1.08 to \$1.25 per yd., and another lot at \$1.07 to \$1.19 per yd., for total value of \$27,000. This was all resurfacing of existing asphalt paving. Mack Paving Co. and David McMahon estate divided contracts for paving with vitrified brick, at prices ranging from \$1.98 to \$2.05. Value of this work is \$24,500.

**Uniontown, Pa.**—By Commissioners of Fayette County contract for construction of road in German Township to John T. Hoover, Uniontown, at \$15,000. Willard O. White is County Engr.

**Bastrop, Tex.**—By County Court of Bastrop County contract for constructing about 40 miles of gravel roads to Ray McDonald, Austin, Tex., at \$62,800. J. B. Price is County Judge.

**Plainview, Tex.**—City council has accepted bid of J. E. Penick at 20c. per sq. ft. for putting down concrete street crossings, work to be guaranteed for two years. Crossings will be five feet wide in residence section and seven feet wide in business district. Recent \$12,000 bond issue will be available for this purpose.

**Centalla, Wash.**—By city commission, to Allred & James, a Centalla contracting firm, contract for paving of Maple street from Tower avenue to Gold street. Contract price was \$11,895.

**Seattle, Wash.**—For construction of concrete walks in Fifth ave. N. E. to Washington Construction Co., at \$3,271.45; for regrading, paving, etc., to Russell & Gallagher at \$7,567.75; for grading McClintock st. to Henry Brice at \$3,795, and for paving Grand ave. to T. Ryan at \$46,314.40.

**Spokane, Wash.**—Mitchell Bros. were given contract for paving alley between Trent and Main avenues. Division to Browne street, for \$2,350, the material being concrete and brick. Estimate was \$2,400.

**Spokane, Wash.**—J. B. Mitchell was awarded contract at \$2,569 for grading, retaining wall and drain on 14th avenue, and same firm for curbing, sidewalk and crosswalk same street, at \$2,022.

**Spokane, Wash.**—By Commissioners of Spokane County contract for constructing 6.35 miles of Waikiki rd. (gravel macadam) to John F. Costello, at \$56,650. Other bidders were: Spokane Asphalt & Paving Co., \$65,848; Mitchell Bros., \$66,268; Naylor & Norlin, \$68,990; F. A. Empey, \$99,400.

**Superior, Wis.**—Gus Bong, of Poplar, was low on grading hill east of the Amnicon on Spaulding ave., and acceptance of his bid was recommended. His figure for the job was \$1,051. He was also low for grading one mile of Spaulding ave., east of Amnicon, with a bid of \$1,530. The Russell Construction Co. was awarded concrete culvert work on Spaulding ave., on a bid of \$360. Paul Arcenau was low on grading hill on Black River road at Little Balsam with bid of \$676.

## SEWERAGE

**Hartford, Conn.**—Street Commissioners have decided it was not feasible to adopt plan suggested by city engineer for layout of Homestead ave. intercepting sewer across private property. Engineer Roscoe N. Clark has been instructed to prepare new plan for layout of sewer. New route will follow more closely street lines, but will be more costly to build, and extra appropriation to cover this additional cost will be asked at next election.

**Jackson, Ga.**—Bond election for sewerage has been called for July 8. Amount of bonds to be voted for is \$23,000.

**Fall River, Mass.**—Aldermanic committee on sewers has voted about \$17,000 additional for sewer construction work.

**Albion, Mich.**—Construction of new sewers and other improvements is planned.

**Grand Rapids, Mich.**—City will have to construct all its sewer outlets and much of its system, which includes 192 miles of sewers, as well as erect 2 septic tanks. Estimated cost, \$7,000,000.

**Saginaw, Mich.**—Sewage plant is being considered for city.

**Camden, N. J.**—City has planned construction of following sewers or drains in and along Orchard st., from Chestnut st. to Mt. Vernon st., and Ross st., from Orchard st. to Louis st.; Tenth st., from Butler st. to Lowell st., and in Morton st. and Lowell st., from Tenth st. to Mt. Ephraim ave. A. L. Sayers, St. Comr.

**Newark, N. J.**—Under provisions of act of 1910 authorizing construction of joint municipal sewage disposal plants, Orange common council has passed resolution announcing intention of city to join with East Orange and Montclair in location of Imhoff plant in Belleville and Bloomfield.

**Perth Amboy, N. J.**—Ordinance has been adopted for 12-in. pipe sewer in Brace avenue.

**Perth Amboy, N. J.**—Ordinances have been introduced and passed upon their first reading, to place 15-in. pipe sewer in Convery pl., between New Brunswick and Sayre aves.; and to place a 10-in. pipe sewer in Carson ave., between Brace ave. and Harrington st.

**Long Island City, L. I., N. Y.**—Queens local boards have passed resolutions initiating 33 sewer and highway improvements, estimated cost of which aggregates \$384,010.

**Northport, L. I., N. Y.**—Vrooman & Perry, of Grovesville and Amsterdam, are preparing plans for 2 miles of sewers and sewage disposal plant.

**Scotta, N. Y.**—Bids will be received at office of Village Clerk until 8 p. m., June 18, for purchase of sewer bonds. E. C. Hoyt, Village Clerk.

**White Plains, N. Y.**—Sewer Committee has presented agreement regarding new sewer planned to be constructed through that town by village. Estimated cost of sewer is \$14,146.20, plus engineering and other expenses. This sewer will drain section of Scarsdale Estates, and all of White Plains Park.

**Dunn, N. C.**—Town fathers and citizens committee have instructed Mr. Gilbert C. White, who has been consulting with the authorities, to prepare plans and specifications and advertise for bids for complete sewerage system for town. It has been definitely decided to go to Black River as outlet and use disposal tanks when river is low in fall and summer.

**Canal Dover, O.**—City Council will install sewage disposal plant about one mile south of city, between river and canal, to cost about \$60,000.

**Chester, Pa.**—Borough Council is planning to build new sewer on Market st., between Fourth and Ninth sts., for purpose of carrying off storm water. This sewer will cost borough about \$1,000. It will be of not less than 8-in. pipe and may be a 10 or 12-in. capacity. This will be paid for by borough out of funds probably to be derived from loan fund.

**Chester, Pa.**—Commissioners of Upper Darby township have adopted ordinance to borrow \$35,000 for purpose of constructing and installing a sewerage system in township.

**East Mauch Chunk, Pa.**—New sewer, to cost \$10,000, will be constructed.

**Lebanon, Pa.**—City Engineer Crowell has outlined plans for extending system to north side. New sewer district is to include territory between Fourth and Twelfth sts., nor of Quittapahilla Creek, to city's limits on north.

**Philadelphia, Pa.**—Construction of sewers in Lycoming street has been petitioned for.

**Williamsport, Pa.**—Bills have been adopted providing for construction of sewers in various streets.

**Central Falls, R. I.**—Resolution has been passed making appropriation for installation of improved sewerage system.

**Waltersboro, S. C.**—Installation of sewer system is planned.

**Racine, Wis.**—Report favoring the bid of Engineer John W. Alvord of Chicago for making complete sanitary and sewer survey of city of Racine has been drawn up and signed by committee of whole. Alvord's bid for doing the work was in neighborhood of \$6,800.

**Colville, Wash.**—City Council has passed resolutions for construction of sewer system, east of Main st., to cost about \$30,000.

**Calgary, Alta., Can.**—City Commissioners are planning to install trunk sewer system at cost of about \$525,000. J. M. Miller is Clerk.

## CONTRACTS AWARDED.

**Birmingham, Ala.**—For storm sewers involving expenditure of over \$190,000 as follows: Contracts for sections No. 1, 2 and 3 of sewer have been awarded to Southern Asphalt & Construction Co., for \$70,940, \$26,945 and \$70,052, respectively. Fourth section, which is section which goes under network of railroad tracks has been awarded to A. C. Brooks & Co. for \$24,750.30. All awards were made to lowest bidders on recommendations of City Engineer Kirkpatrick and Commissioner Weatherly in charge of streets.

**Boonville, Ind.**—To Julius Keller Construction Co., Indianapolis, contract, at \$74,615.50, for constructing north side brick and vitrified pipe sewer, at Boonville. Wm. A. Schafer is city clerk.

**Belmont, Ia.**—For constructing about 14,000 ft. of 6 and 8-in. vitrified sewers here to M. McElligott, Evanston, Ill., at \$9,200. Other bids were Hake & Bailey, \$9,500; E. F. Beaty, \$10,500.

**Louisville, Ky.**—To construct sewers in Shelby st., from Burnett ave. to city limits, and in Preston st., from Rawlings st. to city limits, to J. H. Cahill, Louisville, Ky., at \$90,041.

**Ruston, La.**—To construct complete sewer system as follows: Laying sewers, etc., to Isaac C. Mishler, Chattanooga, Tenn., at \$25,748; furnishing pipe, to the Texarkana Pipe Co., Texarkana, Tex., at \$10,916.

**Baltimore, Mr.**—Following are bids received for sewer construction by Board of Awards, Sanitary Contract 110, Sanitary District 16 B. Bids for all sewers in open trench: Middleton-Thompson Co., Baltimore, \$125,201; Ryan & Reilly, Union Trust Bldg., \$132,780; McCarthy & O'Herron, 1518 Malster Ave., \$141,184; Whiting-Turner Construction Co., Baltimore, \$155,847; Gallagher, Boyle & Bryan, 147 W. Montgomery St., \$158,502. Bids for all sewers under railway tracks in tunnel: McCarthy & O'Herron, 1518 Malster Ave., \$146,833; Middleton-Thompson Co., Baltimore, \$147,470; Whiting-Turner Construction Co., Baltimore, \$163,464; Ryan & Reilly, Union Trust Bldg., \$170,770; Gallagher, Boyle & Bryan, 147 W. Montgomery St., \$183,897. Storm-water Contract 27: Ryan & Reilly, Union Trust Bldg., \$29,025; Middleton-Thompson Co., Continental Bldg., \$30,329; McCarthy & O'Herron, 1518 Malster Ave., \$30,985; W. H. Thompson Construction Co., Calvert & Reed Sts., \$32,928. Sanitary Contract 108, miscellaneous lateral sewers No. 4: W. H. Thompson Construction Co., Calvert and Reed Sts., \$17,006; Middleton-Thompson Co., Continental Bldg., \$19,080; Gallagher, Boyle & Bryan, 147 W. Montgomery St., \$19,564; Whiting-Turner Construction Co., Sexton Bldg., \$22,768. Sanitary Contract 111, Sanitary District 16 A: Middleton-Thompson Co., \$157,503, said to have been awarded contract; Whiting-Turner Construction Co., \$164,826; Ryan & Reilly, \$168,875; McCarthy & O'Herron, \$186,865. Sanitary Contract 114, Section 8 of the High Level Interceptor: C. B. Clark & Co., 1507 W. Lombard St., \$100,152 (awarded contract); Whiting-Turner Construction Co., Sexton Bldg., \$107,963; Ryan & Reilly, Union Trust Bldg., \$110,104. Sanitary Contract 115: Carozza Levozza & Carozza, 132 Delphin st., \$23,870 (awarded contract); Timothy, Bresnan & Sons, 2018 W. North ave., \$24,718; William McCarthy & O'Herron, 1518 Malster Ave., \$27,209; W. H. Thompson Construction Co., Calvert & Reed sts., \$25,956; Gallagher, Boyle & Bryan, 147 Montgomery st., \$250,105.

**Ann Arbor, Mich.**—To E. L. Schneider, city, contract for constructing 1 mile 8-in. vitrified pipe sanitary sewers. Ross Granger is city clerk.

**Grand Rapids, Mich.**—Contracts have been awarded as follows: Michigan place sewer, C. Vander Weele, \$248,77; Palmer street sewer, Verhey & Kloet, \$720.95; Travis street sewer, Verhey & Kloet, \$763; Fuller avenue and Benjamin avenue sewer, C. Vander Weele, \$3,484.31.

**Pontiac, Mich.**—City Commission has awarded contracts for sewers in 17 streets to Gray-Robinson Construction Co., of Manitowoc, Wis., at total cost of \$18,387.

**Laurel, Miss.**—Laurel City Commissioners has awarded contracts to Dabny & Wetmore, of Meridian, for construction of storm sewers in residence districts where street paving is to be laid this summer.

**St. Joseph, Mo.**—Contract has been finally awarded to E. F. Mignery for sewer in district No. 104, and board has decided to again advertise for bids for sewer in Burnside avenue in district No. 127.

**Cranford, N. J.**—Contract to lay sewer in Pine st. has been awarded to T. Foster Callahan at \$727.20.

**Perth Amboy, N. J.**—P. J. Monaghan was lowest bidder for placing 12-in. pipe sewer in Brace ave. Awarding of this contract was laid over until June 16 and subject was referred to committee of whole for consideration in meanwhile. The bids were as follows: P. J. Monaghan, \$1.19 per lin. ft. of 12-in. pipe, \$33.50 for each manhole. Christian Petersen, \$1.30 for pipe, \$37 for each manhole. Liddle & Pfeiffer, \$1.46 for pipe, \$34 for each manhole. Martin Hansen, \$1.48 for pipe, \$37 for each manhole.

**Perth Amboy, N. J.**—Resolution has been adopted to award contract for placing 15-in. pipe sewer in Broadhead pl. to Liddle & Pfeiffer. Bids were as follows: Liddle & Pfeiffer, \$1.24 per lin. ft. of pipe; \$34 for each manhole. Christian Petersen, \$1.25 for pipe, \$37 for each manhole. P. J. Monaghan, \$1.35 for pipe, \$35 for each manhole. Carl F. Poulsen, \$1.75 for pipe, \$33 for each manhole.

**Hornell, N. Y.**—To Fred A. Gray, of Hornell, for placing sewers in Crosby, Hill, Webster, Canisteo sts., Lucretia, Glenn & O'Connor aves.

**New York, N. Y.**—By President of Borough of Queens, Jackson ave. and Fifth st., Long Island City, to Clancy & Van Alst, at \$19,442, for construction of sanitary sewer in Redfern ave., from McNeill ave. to Leland pl.

**Marysville, O.**—For sewer and disposal plant as follows: Sanitary sewage system, William Graham, Columbus, O., \$59,932.86; disposal plant, Frank Milligan, Bellefontaine, O., \$42,054.40. Riggs & Sherman are engineers, Nasby building, Toledo, O.

**Youngstown, O.**—Low bids on three city jobs have been announced, the most important being that of construction of big Brier Hill district sewer. Contract for this job was divided in two sections, No. 1 to be constructed of pipe and No. 2 of material to be decided later. On section 1 low bid was that of Harris & Kidson, \$25,817.30. The next lowest bid was that of Dioro & Serafino, \$41,475.80. For section 2 of Brier Hill sewer Chas. Harris bid low on brick construction. His figure was \$23,483.40. Using the segment block construction Dioro & Serafino were low bidders, their figure being \$29,897.40. Bids on Salt Springs grading job showed that Kennedy Brothers were low at \$3,457, and for grading and paving Waverly ave. Seaborn & O'Horo were low bidders, at \$7,084.

**Youngstown, O.**—By Board of Control for following sewer improvements: Madison ave. sewer to A. O'Horo, \$4,293.70; Cleveland st. sewer to Clyde Harris, \$3,190.79, and Meadow st. sewer to Anthony O'Horo, at \$385.40.

**Caddo, Okla.**—By board of trustees, contract to Perry Construction Co., Poteau, Okla., at \$25,408.10, for system of sewers.

**Cushing, Okla.**—To lay 3½ miles of vitrified pipe sewers to Stokes Construction Co., Oklahoma City, Okla.

**Eugene, Ore.**—To C. H. Mahony, contract for constructing 400 ft. of 10-in. sewer and 753 ft. of 8-in. sewer commencing at Jefferson st., in alley between Clark and First ave. west.

**South Bethlehem, Pa.**—For laying of additional sewers on various streets, to S. W. Chiles.

**West Chester, Pa.**—To construct Goose Creek sewer from Market and Franklin sts., to Linden, to M. & T. E. Farrell, West Chester, at \$13,500.

**Sioux Falls, S. D.**—For construction of lateral sewer on Prairie ave. for Seventeenth to Nineteenth sts., to Myrmo Bros. at \$388.05, and for sewer on Twelfth st. same firm was lowest bidder at \$1,397.60.

**Dallas, Tex.**—C. W. Olcott contract for laying 6-in. sanitary sewer across Beacon and in alley between East Side and Alston at a cost of \$119, with 17c. for rock trench and \$12 for manholes.

**Pecos, Tex.**—To construct approximately 10 miles of sanitary sewers and sewer laterals, to A. T. Muller, Dallas, Tex.

**Richmond, Va.**—Contracts for construction of sewers have been awarded by Board recently as follows: Claiborne st., between Allen ave. and Meadow st., to McAughey & Van Doren, \$1,189.70; Coutts st., between St. Paul and St. John sts., to Brock Pollard, \$211.43. Sheppard st., between Grove ave. and Hanover

ave., to the National Construction Co., \$42.50; Mulberry st., from Cary st. to the alley south of Cary st., to Nicholas & Henly, \$396.30; Stuart ave., from West st. to Sheppard st., to Brock Pollard, \$420.80.

## WATER SUPPLY

**Phoenix, Ariz.**—Election has been called for voting on question of issuing \$30,000 worth of water bonds.

**Lodi, Cal.**—City Trustees have purchased a lot for installation of auxiliary water pumping plant. City Superintendent will immediately bore 12-in. well and connect pump direct with large water main.

**Rio Vista, Cal.**—Improvements to city water system have been ordered by Town Trustees, to include new filtration plant and pump. These must be in working order July 1st, according to contract let.

**Washington, D. C.**—Orders for laying of 3,400 ft. of water main have been issued by engineer department of District of Columbia. Of this amount, it is directed that 440 ft. of 12-in. main be laid in east side of North Capitol st., between G st. and Massachusetts ave., and 325 ft. of pipe of the same size laid in north side of Massachusetts ave., between North Capitol st. and Union Station Plaza. Nine hundred and twenty-five feet of 12-in. main are ordered to be laid in Fern st., between Georgia ave. and 13th st., 370 ft. of 8-in. main in 13th st., between Fern and Holly sts., and 840 ft. of 8-in. main in Holly st., west from 13th st.

**Bangor, Me.**—It has been voted that committee on city water be authorized and instructed to buy pump and properly equip new artesian well at corner of Main and Centre sts.

**Baltimore, Md.**—Residents along Belair road are preparing to make strenuous campaign for adequate supply of water.

**Easthampton, Mass.**—Town contemplates laying one mile of 6 and 8-in. water pipe. Estimated cost, \$5,000. W. C. Tannatt, Jr., is Town Engr.

**Framingham, Mass.**—Town is considering expenditure of \$30,000 for extending water system. Frank E. Hemenway is Town Clk.

**Albion, Mich.**—Extension of water mains is being planned.

**Battle Creek, Mich.**—Second waterworks system will be installed.

**Olivet, Mich.**—Installation of waterworks plant is being discussed; estimated cost, \$14,500.

**Duuth, Minn.**—Over \$90,000 of improvements and number of extensions for water and light department are in abeyance pending disposal of \$100,000 of water and light bonds, part of issue of \$300,000 authorized at municipal election two years ago.

**Minneapolis, Minn.**—A filtration plant to cost \$100,000 is being considered.

**Virginia, Minn.**—City council has sold the \$450,000 water and light bonds to Bolger, Messer & Williams.

**Wabasha, Minn.**—Village Council is contemplating installation of water and sewer systems, estimated to cost about \$35,000.

**Richton, Miss.**—Election is to be held June 10 for voting on \$10,000 bond issue for installation of waterworks system.

**Milwaukie, N. J.**—Installation of \$40,000 waterworks system has been recommended.

**Scotia, N. Y.**—Bids will be received at office of Village Clerk until 8 p. m. June 18, for purchase of water bonds. E. C. Hoyt, Village Clk.

**Alliance, O.**—City will build immense reservoir in Knox township.

**Barberton, O.**—Special election for voting on \$20,000 waterworks bonds has been carried by large majority.

**East Liverpool, O.**—Citizens are urging installation of filtration plant.

**Youngstown, O.**—Plans have been completed in regard to Milton reservoir and for improved water supply.

**Durant, Okla.**—Benham Engineering Co., Oklahoma City, Okla., will prepare plans for proposed extensions to water and sewer systems for which bonds for \$80,000 have been voted. W. P. Danford is City Engr.

**Canyon, Ore.**—Bids will be received by Recorder of town of Canyon City until Wednesday, the 2d day of July, A. D. 1913, at 12 p. m., for the purchase of \$6,000 bonds. C. P. Haight, Recorder.

**Eugene, Ore.**—Bids received for \$100,000 issue of water works improvement bonds have been rejected.

**Barnesboro, Pa.**—Ordinance authorizing bond issue of \$35,000 to purchase holdings of Northern Cambria Water Co. will be presented at regular meeting of Barnesboro Council.

**Homestead, Pa.**—Sum of \$23,000 will be expended for improvement of waterworks system.

**Walterboro, S. C.**—Rebuilding of waterworks system is planned.

**Spur, Tex.**—At election held in Spur to vote on \$25,000 water works bond issue, bonds carried with but one dissenting vote. Construction will begin in near future.

**Temple, Tex.**—Belton City Council has ordered election to be held July 2 for voting on bond issue of \$24,000 for water works improvements and extensions.

**Richmond, Va.**—Mayor Ainslie recommends new storage reservoir.

**Richmond, Va.**—Superintendent of Water Works has been directed to lay water main in Twenty-seventh st., between S and U sts., at cost of \$637.50.

**Cobb, Wis.**—Installation of waterworks system is being considered.

## CONTRACTS AWARDED.

**Fontana, Cal.**—To Baker Iron Works, for furnishing Fontana Water Co. with about \$20,000 worth of water pipe.

**Los Angeles, Cal.**—For constructing water distributing system in Montrose to Los Angeles Mfg. Co., Los Angeles, at approximately \$100,000.

**Washington, D. C.**—To furnish and deliver 10,000 ½-in. water meters by District Commissioners to Pittsburgh Meter Co., Pittsburgh, Pa.

**Washington, D. C.**—To Pittsburgh Meter Co., of East Pittsburgh, Pa., contract for furnishing city with 10,000 ½-in. Type W, "Keystone" meters.

**Baltimore, Md.**—Henry Smith & Sons of this city are apparently lowest bidder for concrete, excavation and general contracting work in connection with filtration plant, bids for which were opened by board of awards. There were 10 bidders for contract. Bid of Smith concern is roughly estimated at \$390,000. Stewart-Jones & Co., next lowest bidder, estimate work at \$393,000. All of bids have been referred to water department for tabulation.

**Merrimac, Mass.**—Board of water commissioners has awarded contract for Locust street extension of water system to Robert G. Watkins of Amesbury, but two bids being received in answer to request of board for such bids. Contract price is 27½c. per lin. ft. Order for pipe went to R. D. Wood & Co. of Philadelphia.

**Maple Lake, Minn.**—For installing water system as follows: Tower and tank, to the Minneapolis Steel & Bridge Co., Minneapolis, Minn.; sinking well, to F. J. Kopp, Minneapolis; furnishing and laying pipe to W. D. Lovell, Maple Lake. Total cost, \$12,000.

**Atlantic City, N. J.**—To haul and lay about 6,000 ft. of 48-in. c-i. water pipe, furnish and drive 70,000 lin. ft. of piles, and construct about 750 cu. yds. of reinforced caps and incidentals to W. F. Fritz, East Orange, N. J., at \$55,360.

**Peru, Neb.**—For construction of water works system, to Inter-Mountain Bridge & Construction Co., Tecumseh, Neb., \$18,784.84. Other bids as follows: Nebraska Construction Co., Lancaster, Neb., \$18,890; Briggs & Co., Shenandoah, Ia., \$18,960; Des Moines Bridge & Iron Co., \$18,955; P. C. Brooks & Son, Jackson, Mich., \$18,828.

**Akron, O.**—P. T. McCourt of Akron will probably be awarded contract for building of immense dykes around big reservoir in Cuyahoga river near Kent at bid of \$154,321.

**Cincinnati, O.**—To furnish pipe during year 1913 to the U. S. Cast Iron Pipe & Foundry Co., at \$53,110. Contract to lay pipe to Thomas J. Scully, 416 Mill st., Cincinnati, O., at \$37,535.

**Cushing, Okla.**—To lay about 7½ miles of c-i. water mains and 3½ miles of sewers to Stokes Construction Co., Oklahoma City, Okla.

**Seattle, Wash.**—For construction of water mains on W. 61st st. to N. Florito Bros. and Sauro, at \$2,666.65 and on N. 82d St., to T. Ryan at \$26,322.40.

**Appleton, Wis.**—To Builders' Iron Foundry, of Providence, R. I., for one Venturi meter at \$980.

**Superior, Wis.**—The Superior Water, Light and Power Co. has been awarded contract for laying water and gas connections on Cumming avenue, between North 3d and North 8th streets. Bid was \$1,380. J. P. Wray & Co., only other bidder, asked \$1,671 for the job.



## LIGHTING AND POWER

**Batesville, Ark.**—Plans are being discussed by Commissioners of Water and Electric Plant, for construction of new power plant.

**Hartford, Conn.**—Request has been sent to Board of Contract and Supply to advertise for bids for furnishing 109 two-light standards for street lights, and 100 single-light standards, bids also to include price for additional standards above number specified. Plans and specifications for these iron standards can be seen at office of superintendent of streets, Leon F. Peck.

**Burlington, Ia.**—Ordinance has been passed providing for placing of electric light wires and power wires under ground within certain limits and regulating placing of such wires under ground.

**Clinton, Ia.**—Plans are being made for installation of lighting system on Main st.

**Spencer, Ia.**—Extensive improvements to municipal electric light plant are planned.

**Jeffersonville, Ky.**—City Clerk has been authorized to advertise for bids for street lighting after Jan. 1, 1914.

**Bangor, Me.**—Recommendations for new system of street lights in business section of Bangor are to be laid before Bangor City Council by committee on street lights from Chamber of Commerce.

**Holyoke, Mass.**—Town has voted in favor of municipal lighting project.

**Bay City, Mich.**—Estimates prepared by committee in charge of proposed White Way street lighting plans show that between \$21,000 and \$23,000 will be necessary to install either of systems under consideration.

**Kalamazoo, Mich.**—Plans have been made to adopt boulevard lighting system along Portage street and Washington avenue. Plans which were talked over was to install 20 and 30 cement posts in vicinity of two streets.

**Starbuck, Minn.**—Town Council is contemplating installation of additional equipment in municipal electric light plant. A. H. Dreyer is Supt.

**Virginia, Minn.**—Light and water bonds in sum of \$450,000 have been sold to Bolger, Mosser & Williams.

**Fairbury, Neb.**—Installation of street lighting and power system is being planned. G. D. Meyers is Supt. of municipal electric light plant.

**Silver Creek, Neb.**—Bonds in sum of \$16,000 have been voted for construction of electric light plant and water system. D. F. Davis is Village Clk.

**Wilber, Neb.**—Bonds in sum of \$12,000 have been voted for reconstruction of electric light system.

**Hempstead, L. I., N. Y.**—At special meeting of town board of Hempstead it was voted to advertise for bidders to supply gas in what is known as Bellmore-Seaford-Wantagh Lighting district.

**Grand Forks, N. D.**—City council has decided to operate municipal light plant.

**Barberton, O.**—Citizens of Barberton in special election carried bond issues for new electric light and waterworks plant by big majority. The \$110,000 bond issue for new light plant carried, 675 for to 130 against.

**Portland, Ore.**—By vote of 12 to 1 city council has granted to Northwestern Electric Co. a 25-year franchise to install and operate steam heating system for furnishing heat to buildings throughout city.

**Lebanon, Pa.**—The Lebanon Gas & Fuel Co. is starting big movement for better lighting of business section of city.

**Royalton, Pa.**—Councilmen have turned down all bids for installation of electric lighting system, and determined to put in municipal electric plant.

**Dallas, Tex.**—Establishment of municipal electric light and power plant is under consideration.

**Floresville, Tex.**—Plans are being made by the H. B. Harmon and O. A. Sims, of Beeville, Tex., for construction of a \$15,000 electric light plant.

**Franklin, Tex.**—City Commission is contemplating plans for purchase of local electric light and waterworks plants.

**Richmond, Va.**—In lieu of resolution appropriating \$26,150 for ornamental lights on Main st. and on Seventh, Eighth and Ninth sts. Finance Committee has reported resolution appropriating \$9,364 for additional flaming arc lamps on those streets.

**Puyallup, Wash.**—Council is considering municipal electric lighting.

**Spokane, Wash.**—Commissioner Coates has reported to city council that he had let contract for rewiring Monroe street

bridge electroliters, using lead conduits instead of rubber-covered wire, to Commercial Electric Co., at \$844.60.

## CONTRACTS AWARDED.

**San Francisco, Cal.**—For installation of electric light system at Fort Mason to Newberry-Bendheim Electric Co., of this city at \$15,700.

**Centerville, Ind.**—For construction of electric light plant to Richmond Electric Co., Richmond, at about \$6,000.

**Scott City, Kan.**—Contract for municipal light plant and waterworks system here has been awarded by City Council to Alimo Construction Co. of Omaha, which entered bid of \$33,867. It calls for a No. 33 six and three-fourths inch double suction Downey pump for waterworks system.

**Fall River, Mass.**—Mayor Kay of Fall River has signed contract for "White Way" lights for period of five years. Under terms of contract city must pay two-thirds of cost. Other third is to be paid by merchants to Fall River Electric Light Co.

**Worcester, Mass.**—By Worcester Gas Light Co. contract for improvement of its gas plant to Riter-Conley Co., Pittsburgh, Pa., at \$216,270.

**Madison, Wis.**—Contract for construction of municipal power and electric light plant has been awarded to Coddington Engineering Co., Milwaukee, Wis., at \$29,100.

**Chatham, N. J.**—By Common Council, following contracts for additions to municipal electric light and water plant on bids recently received: One 100-kw. turbo-generator unit, \$4,612; one 75-kw., 2,300-volt, three-phase generator and exciter, \$1,328, and one switchboard complete, \$1,766 (total for three items, \$7,336) to the Fort Wayne Electric Works; one 500,000-gal., motor-driven pump, \$1,245, and one 150-hp. condenser, \$723 (total for two items \$1,968); to the Manistee Iron Working Co.: radial brick chimney, \$1,493, to the Heine Co., New York; industrial railway, complete with charging car and scales, \$325, to Ernest Weiner. Contract for building alterations to the plant, awarded to Stull & Philhower, Madison, N. J., at \$1,790.

**Columbus, O.**—For installation of electric light plant in Neill House, contract to McKeever Electric Co., at \$40,000.

**De Pere, Wis.**—Contract for furnishing light for street lamps has been awarded to De Pere Electric Light & Power Co.

## FIRE EQUIPMENT

**Bridgeport, Conn.**—Extensive improvements in fire alarm and fire hydrant systems in first district are being contemplated.

**Waterbury, Conn.**—Fire Chief Samuel C. Snagg has recommended motorizing of entire department. Chief favors purchase of tractors for Burton street truck and for engine at Brooklyn house. A new 65-foot aerial truck to cost \$10,000 is recommended for Scovill street house, also combination chemical and hose automobile, to cost \$5,500. Combination chemical and hose wagons are recommended for Brooklyn house and Baldwin and Willow street houses. In addition to these chief believes that instruction automobile should be bought so that in breaking in drivers for different pieces of apparatus men will not need to use new machines. An automobile is also recommended for superintendent of fire alarm telegraph. Total recommended amounts to \$44,500.

**Waterbury, Conn.**—It has been voted that city of Waterbury be given permission to issue bonds to amount of \$75,000 for purchase of additional fire apparatus.

**Wilmington, Del.**—Weccacoe Fire Co. of Wilmington, has decided to purchase tractor for its engine, to replace horses, and Brandywine Fire Co. is considering a similar change.

**Donaldsonville, La.**—Bids will shortly be asked for furnishing city with 500 ft. of hose.

**Bliddeford, Me.**—The committee on fire department has voted to buy invincible nozzle, also called swivel gun, which is carried on No. 1 hose carriage and into which four streams can be concentrated.

**Peak Island, Me.**—Installation of alarm system is being discussed.

**Watertown, Mass.**—Purchase of motor pumping engine is recommended.

**Ann Arbor, Mich.**—Sum of \$1,500 has been appropriated to purchase a hose truck, hose, ladders and other apparatus.

**Manchester, N. H.**—City is considering purchase of a piece of motor apparatus to cost about \$8,000.

**Matawan, N. J.**—Fire chief recommends installation of alarm system.

**Moorestown, N. J.**—Appropriations amounting to \$4,000 have been authorized among which was an item for \$2,500 which will be used to secure automobile fire truck for Relief Engine Co.

**Perth Amboy, N. J.**—McClellan Engine Co. has petitioned to Council for new hose and chemical apparatus to replace its present wagon.

**Wildwood, N. J.**—City of Wildwood will issue \$17,000 bonds for fire apparatus and appliances for Holly Beach Co.

**Hudson, N. Y.**—Purchase of motor combination wagon is being considered.

**Oneida, N. Y.**—Proposition to raise sum of \$7,000 in bond for purpose of procuring and installing new fire alarm system, procuring new 55-foot improved hook and ladder truck, purchasing 1,800 feet additional hose, and to secure other necessary modern equipment for fire department, has been voted for.

**Dayton, O.**—Safety Director A. May Dodds has submitted his estimate, in response to request from City Council, as to cost of equipping fire department with motor-driven appliances, fixing total cost at \$118,450. These prices are based upon what he considers to be fair estimate of average prices of high-grade motor apparatus, but may be reduced somewhat by competitive bidding: Nine hose cars at \$5,250, \$47,250; two city service ladder trucks at \$6,000, \$12,000; two 85-ft. aerial trucks at \$11,000, \$22,000; six tractors for steam engines at \$4,500, \$27,000; one automobile for chief, \$3,000; two automobiles for the marshals at \$1,800, \$3,600; two trucks for hydrant and telegraph department at \$1,800, \$3,600; total, \$118,450.

**Sandusky, O.**—Resolution has been passed authorizing bond issue of \$20,000 for purchase of motor aerial truck and one combination pump, hose and ladder truck.

**Youngstown, O.**—Aerial truck may be purchased by city.

**Chester, Pa.**—Purchase of new automobile chemical engine has been authorized for the Hanley Hose Company.

**Cottonwood, S. D.**—Purchase of two chemical engines and other equipment will probably be ordered.

**El Paso, Tex.**—City is going to purchase 3,000 ft. of fire hose for large fire auto truck of Sunset fire department. Purchasing Agent A. Murdoch is asking for bids on the hose.

**Fort Worth, Tex.**—Bids are being received for purchase of 5,000 ft. of fire hose.

**Richmond, Va.**—Mayor Ainslie recommends purchase of new fire alarm apparatus, also new fire pump on city tug.

**Milwaukee, Wis.**—City of Milwaukee will expend \$50,000 in purchase of fire apparatus during 1913. Requirements will include two motor fire engines, three motor ladder trucks, and remainder combination hose, chemical and squad cars. Calls for bids will be made soon.

## CONTRACTS AWARDED.

**Baltimore, Md.**—L. A. Blum has secured contract to install complete fire alarm system at Brooklyn.

**Harbor Springs, Mich.**—To Voorhees Rubber Co., through its agents, Grether Fire Equipment Co., of Dayton, O., contract for furnishing village with cotton rubber-lined hose.

**Ocean City, N. J.**—For furnishing two tractors to steamers, one motor combination chemical and hose wagon and a chief's car, to White Co., of Cleveland, O., through Richard Edwards, Atlantic City, N. J., agent, at \$9,475.

**New York, N. Y.**—For furnishing 22 pieces of motor apparatus, bids were received as follows: Ten two-wheeled tractors attached to steamers—Front Drive Motor Co., Hoboken, N. J., \$37,500; American-La France Fire Engine Co., Inc., Elmira, N. Y., \$45,000; Robinson Fire Apparatus Mfg. Co., St. Louis, Mo., \$31,500; American & British Mfg. Co., Providence, R. I., \$52,000. Ten hose wagons—International Motor Co., 1764 Broadway, New York City, \$42,500; two pumping engines (gasoline), Nott Fire Engine Co., Minneapolis, Minn., \$13,000; Waterous Engine Works Co., St. Paul, Minn., \$16,300; American-La France Fire Engine Co., Inc., Elmira, N. Y., \$17,000; the Webb Co., Allentown, Pa., \$13,400; Robinson Fire Apparatus Mfg. Co., St. Louis, Mo., \$13,650; Rochester Motor Fire Pump Co., Rochester, N. Y., \$24,000. Contracts have been awarded as follows: For tractors to Robinson Fire Apparatus Mfg. Co.; hose wagons to International Motor Co.; pumping engines to Nott Fire Engine Co.